

JPL PUBLICATION 85-43, VOLUME II, PART A

579P

1N-28811

Total-Dose Radiation Effects Data for Semiconductor Devices 1985 Supplement

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(NASA-CR-179746) TOTAL-DOSE RADIATION
EFFECTS DATA FOR SEMICONDUCTOR DEVICES. 1985
SUPPLEMENT. VOLUME 2, PART A (Jet Propulsion
Lab.) 579 p

N86-33177

CSCL 20L

G3/76 Unclass
44624

May 15, 1986



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

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| 1. Report No. JPL PUB 85-43, Vol. II Parts A & B | | 2. Government Accession No. | | 3. Recipient's Catalog No. | |
| 4. Title and Subtitle Total-Dose Radiation Effects Data for Semiconductor Devices 1985 Supplement | | | | 5. Report Date May 15, 1986 | |
| | | | | 6. Performing Organization Code | |
| 7. Author(s) K. Martin, M. Gauthier, J. Coss, A. Dantan, W. Price | | | | 8. Performing Organization Report No. | |
| 9. Performing Organization Name and Address JET PROPULSION LABORATORY California Institute of Technology 4800 Oak Grove Drive Pasadena, California 91103 | | | | 10. Work Unit No. | |
| | | | | 11. Contract or Grant No. NAS 7-100 | |
| | | | | 13. Type of Report and Period Covered | |
| 12. Sponsoring Agency Name and Address NATIONAL AERONAUTICS AND SPACE ADMINISTRATION Washington, D.C. 20546 | | | | 14. Sponsoring Agency Code RE230 BW-323-51-43-00-11 | |
| | | | | | |
| 15. Supplementary Notes | | | | | |
| 16. Abstract <p>This document provides steady-state, total-dose radiation test data, in graphic format, for use by electronic designers and other personnel using semiconductor devices in a radiation environment. The data were generated by JPL for various NASA space programs. The document is in two volumes: Volume I provides data on diodes, bipolar transistors, field effect transistors, and miscellaneous semiconductor types, and Volume II (Parts A and B) provides data on integrated circuits.</p> <p>The data are presented in graphic, tabular, and/or narrative format, depending on the complexity of the integrated circuit. Most tests were done using the JPL or Boeing electron accelerator (Dynamitron) which provides a steady-state 2.5-MeV electron beam. However, some radiation exposures were made with a Cobalt-60 gamma ray source, the results of which should be regarded as only an approximate measure of the radiation damage that would be incurred by an equivalent electron dose. All data were generated in support of NASA space programs by the JPL Radiation Effects and Testing Group (514).</p> | | | | | |
| 17. Key Words (Selected by Author(s)) Space Radiation Electronics and Electrical Engineering | | | | 18. Distribution Statement Distribution unlimited | |
| 19. Security Classif. (of this report) Unclassified | | 20. Security Classif. (of this page) Unclassified | | 21. No. of Pages | |
| | | | | 22. Price | |

★JPL/NASA GROUND TEST RADIATION DATA BANK★

RADATA

A JPL/NASA electronically accessible data bank (called RADATA) consisting of total-dose and Single Event Upset(SEU) ground based test data is now available for government and industry use. The test data were developed by JPL during the period from August 1981 through August 1985. New data will be added on a continuous basis as it becomes available. RADATA is available, at no charge to the user, by dial up phone lines or TELNET.

RADATA is menu driven and allows the user to peruse the index of available test data or search for a specific manufacturer's name, device type, or function. Selected test data may then be displayed on the user's monitor and, if desired, a copy may be downloaded to the user's terminal, sent by electronic NET mail, or postal mail.

PROTOCOL- Set your terminal and/or modem to full duplex (the system uses auto baud rate detection for speeds up to 9600 baud), 8 bit format, 1 stop bit, and no parity. After you have set protocol, use one of the following methods to access RADATA:

a) ACCESS BY PHONE LINES-

1. using a modem, dial (818)354-5125 or (818)354-4360 (backup)
2. after the CONNECT prompt, press the RETURN/ENTER key twice.
3. input RADATA to the username prompt
4. press the RETURN/ENTER key

b) ACCESS BY TELNET- If your facility is tied into MILNET or ARPANET you may access RADATA as follows:

1. enter TELNET JPL-MILVAX or TELNET JPL-VLSI after your prompt sign
2. after the CONNECT prompt, press the RETURN/ENTER key twice
3. input RADATA to the username prompt
4. press the RETURN/ENTER key

NOTE: Using TELNET may increase the amount of transmission problems and slow down the response time when transmitting and receiving data.

c) ACCESSING FROM JPL USING ILAN-

- 1) enter ILAN normally
- 2) respond to the ILAN prompt character with CONNECT GPVAX or CONNECT VLSI
- 3) input RADATA to the username prompt
- 4) press the RETURN/ENTER key

d) ACCESSING FROM JPL USING PHONE DIAL UP-

- 1) using a modem, dial X45125 or X44360
- 2) after the CONNECT prompt, press the RETURN/ENTER key twice
- 3) input RADATA to the username prompt
- 4) press the RETURN/ENTER key

JPL PUBLICATION 85-43, VOLUME II, PART A

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1985 Supplement

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**National Aeronautics and
Space Administration**

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The research described in this publication was carried out by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

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ABSTRACT

This document provides steady-state, total-dose radiation test data, in graphic format, for use by electronic designers and other personnel using semiconductor devices in a radiation environment. The data were generated by JPL for various NASA space programs. The document is in two volumes: Volume I provides data on diodes, bipolar transistors, field effect transistors, and miscellaneous semiconductor types, and Volume II (Parts A and B) provides data on integrated circuits.

The data are presented in graphic, tabular, and/or narrative format, depending on the complexity of the integrated circuit. Most tests were done using the JPL or Boeing electron accelerator (Dynamitron) which provides a steady-state 2.5-MeV electron beam. However, some radiation exposures were made with a Cobalt-60 gamma ray source, the results of which should be regarded as only an approximate measure of the radiation damage that would be incurred by an equivalent electron dose. All data were generated in support of NASA space programs by the JPL Radiation Effects and Testing Group (514).

PREFACE

Volume II of the Total-Dose Radiation Effects Data for Semiconductor Devices, 1985 Supplement contains new test data generated since the December 1, 1981 release data of the original Volume II, JPL Publication 81-66.

There are two parts to Volume II. Part A contains data for devices starting with the 1802 CMOS Microprocessor and ending with the LM108 OP AMP. Part B contains data for devices starting with the LM111 Voltage Comparator and ending with the SMP-11 Sample and Hold. For ease in referencing, the Index and Appendixes are included in both Parts A and B.

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^aSee Appendix A for Vendor Identification Code List.

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^aSee Appendix A for Vendor Identification Code List.

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SECTION I

INTRODUCTION

The data presented in this Volume II Supplement describe the results of Total Ionizing Dose (TID) tests of integrated circuits (ICs).¹ The data were obtained by the Jet Propulsion Laboratory (JPL) in order to assure the "hardness" (radiation resistance) of components to be used in a variety of radiation environments; however, the data is applicable to any ionizing (total dose) radiation environment. Two primary radiation-source types were used: Cobalt-60 gamma rays and Dynamitron electron accelerators capable of delivering 2.5-MeV electrons at a steady rate. Complex IC irradiations were carried out by the Boeing Radiation Effects Laboratory (BREL) in Seattle, Washington, where the necessary computerized test equipment was available. The work at BREL was subject to JPL specifications and procedures.

Some of the data are presented in a graphic format for various operating conditions as a function of dose. A measure of the statistical variation of each device lot is provided by the tabulated standard deviations at the bottom of each graph. Information on other ICs is presented in a tabular format. For more complex large-scale integrated circuit (LSI) types of devices, the data are given in a narrative form, which gives proper emphasis to the radiation-induced changes in the measured parameters. Where there are irradiations of two or more different lots of a given device type, each lot is treated as an entirely separate test.

¹Volume II contains only integrated circuit data. For data on diodes, bipolar transistors, and miscellaneous semiconductor types, refer to Volume I.

All data taken here substantially meet the specifications of MIL-STD-883, method 1019, for environments where short-term annealing is not a relevant problem. Each test consisted of three or more radiation levels at room temperature, and the devices under test were maintained at worst-case bias conditions during the radiation exposure. Electrical parameter measurements were commonly taken within 20 minutes of completion of irradiation.

SECTION II

DOCUMENT USES AND LIMITATIONS

The purpose of this report is to provide test data for integrated circuits exposed to steady-state ionizing radiation. As such, it offers a useful comparison of the radiation response of different devices that might be considered in the development (circuit design) of a radiation-hardened system. It also offers a quick method for determining the weak links in an existing system, and an approximation of the system radiation tolerance as a whole.

The data presented here cannot be used as a substitute for a comprehensive testing program of the devices actually used in a given system. It will be clear on inspecting the data herein that there are large lot-to-lot or wafer-to-wafer variations in the sample responses of a given device type. The response difference from functionally identical devices fabricated by different manufacturers is even greater. There was no attempt to remove "maverick" (outlier) devices from the data plots, so some data plots may appear anomalous when compared to other plots for the same device type. It should be noted that given manufacturers may make minor adjustments in their processing procedures that will result in a major difference in the device radiation response.

SECTION III

RADIATION SOURCES AND DOSIMETRY

A. DYNAMITRON

The Dynamitron electron accelerators at JPL and BREL provide a 2.5-MeV electron beam with beam currents ranging from 10^8 to 10^{10} electrons/cm²/second. All tests described here were irradiated at a given fluence level for exposure times between 5 and 45 minutes.

The test geometry for the two dynamitron test facilities is essentially the same. The electron beam is brought out of the beam tube through a 0.05-mm titanium window, copper and aluminum scattering foils, and 0.9 m of air. Each of these materials scatters the electrons slightly so that the scattered beam has a uniformity variation of less than 20 percent over the test device array, which is confined within a 25-cm-diameter circle perpendicular to the beam direction. At the center of the circle is the aperture of a vacuum Faraday cup, which is used to measure the electron beam flux and fluence. The beam is centered on the Faraday cup with a quadrupole magnet prior to the installation of the test samples. The output from the Faraday cup is a current that is fed into a current integrator, which is calibrated daily against a standard current source. The integrator is set to shut off the electron beam automatically when the desired fluence level is received at the Faraday cup.

B. COBALT-60 SOURCES

The Cobalt-60 gamma ray sources at JPL and BREL were both used. The gamma rays consisted primarily of 1.17 and 1.33 MeV photons with lower energy photons and secondary electrons arising from scattering and absorption. The gamma field was uniform within ± 10 percent in the parts exposure area, which was verified by thermoluminescent dosimetry (TLD), consisting of lithium fluoride/Teflon microrods. The main source calibration was performed with Landsverk ion

chambers of ± 2 percent accuracy, traceable to the National Bureau of Standards, and monthly dose rate computations performed to account for the radioactive decay of the Cobalt-60 source. Exposure times with the Cobalt-60 sources were typically 5 to 20 minutes for each radiation level. Longer times (up to 4 hours) were required for high-dose applications because the maximum uniform dose rate available was 50 rads/second.

SECTION IV

TEST SETUP AND PROCEDURES

A. GENERAL REMARKS

The test setup and procedures used here were developed in accord with the specifications of MIL-STD-883, method 1019. All tests were done at 25°C \pm 3°C, using low noise power sources and instrumentation subject to periodic calibration. Some tests were performed in situ (without removing the test devices from the radiation area), whereas others required remote testing, using a mobile bias fixture to maintain bias except during the brief measurement period.

A detailed test plan was written for each test, including description, irradiation bias conditions, radiation levels, electrical parameters to be measured, and measurement conditions. The data were processed by hand and computer with the calculation of normal means and standard deviations made after deletion of clearly erroneous data. Individual data can be retrieved, if required, by specifying the JPL log number given with each data plot to the Radiation Effects and Testing Group (Section 514) at JPL.

B. IN SITU TESTING

A matrix board switching system was built to be used as a master control and switching panel set up outside the irradiation area. The matrix board interfaces the devices under test (DUT) to the power supplies and measurement equipment via a special 15-meter (50-foot), double-shielded cable (see Figure 1). A built-in potentiometer for each DUT could be used to control bias voltages and currents. The matrix board was designed with very high insulation resistance so that very low current measurements (10-50 pA) could be made.

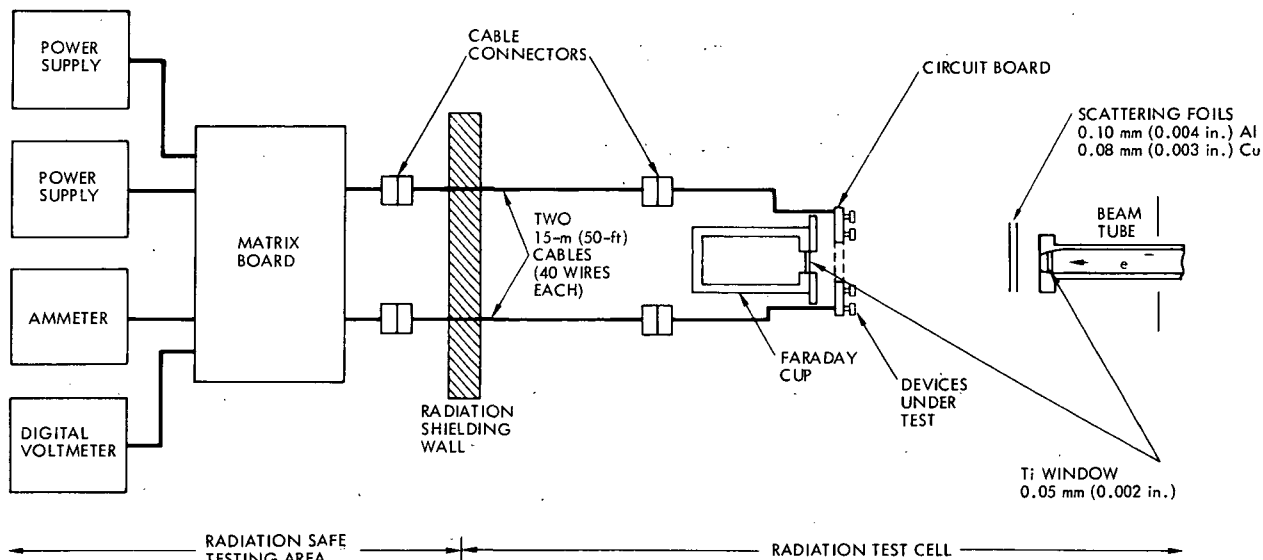


Figure 1. Block Diagram of the Test Setup for in situ Testing With the Electron Accelerator (Dynamitron)

C. NON-IN SITU TESTING

For non-in situ, remote tests the DUTs were removed from the radiation site for approximately 20 minutes between each radiation level. A mobile bias (battery) was applied to the devices at all times except during parameter measurements. Remote measurements were performed using a Tektronix 178/577 curve tracer, a Tektronix 3260 IC tester, or a bench fixture. Occasionally, custom-built test circuits were used to simulate the circuit application of the devices tested.

D. TESTING AT THE BOEING COMPANY

A number of ICs were tested for JPL at the Boeing Radiation Effects Laboratory (BREL). Complex LSI devices -- such as A/D converters, memories, and microprocessors -- were irradiated with the BREL Dynamitron or Cobalt-60 sources and tested on a Tektronix 3260 computerized IC tester. Most of these tests were non-in situ, as described above. The test programs were specified by JPL personnel with the resultant data sent to JPL for analysis.

SECTION V

DATA PRESENTATION

The data are presented in graphic, narrative, and tabular format. A sample graph, explaining the nomenclature, is shown in Figure 2, where each electrical parameter data plot is represented by a single line per graph. Several IC parameters are plotted as delta values, which are the radiation-induced parameter changes as a function of dose. This includes radiation-induced changes in the offset voltage, ΔV_{OS} , offset current, ΔI_{OS} , and bias current, ΔI_B . Offset values are always taken as positive, i.e. absolute, regardless of algebraic sign changes that may occur during the course of irradiation. Both the positive and negative open-loop gain, $\pm A_{VOL}$, are presented in decibels (dB) versus total dose. The other parameters for the ICs are plotted directly; that is, not using delta values. A table at the bottom of each graph lists the test conditions and the normal standard deviations of each data point at each dose level.¹ Tables were omitted in cases where the standard deviations were inconclusive.

Date codes usually indicate when the device was packaged. For example, 7920 indicates the device was packaged in the twentieth week of 1979. If no date code is available, the space may be used for other identifying numbers such as wafer number or lot number.

The word "Fail," shown in some of the tabular data, indicates that the device is no longer dynamically functional, whereas asterisks "***" indicate insufficient or missing data.

¹The log-normal or other types of distributions may provide a better fit for some radiation data than the normal distribution. Hence, caution should be exercised in estimating worst-case conditions based on the limited statistical data presented here.

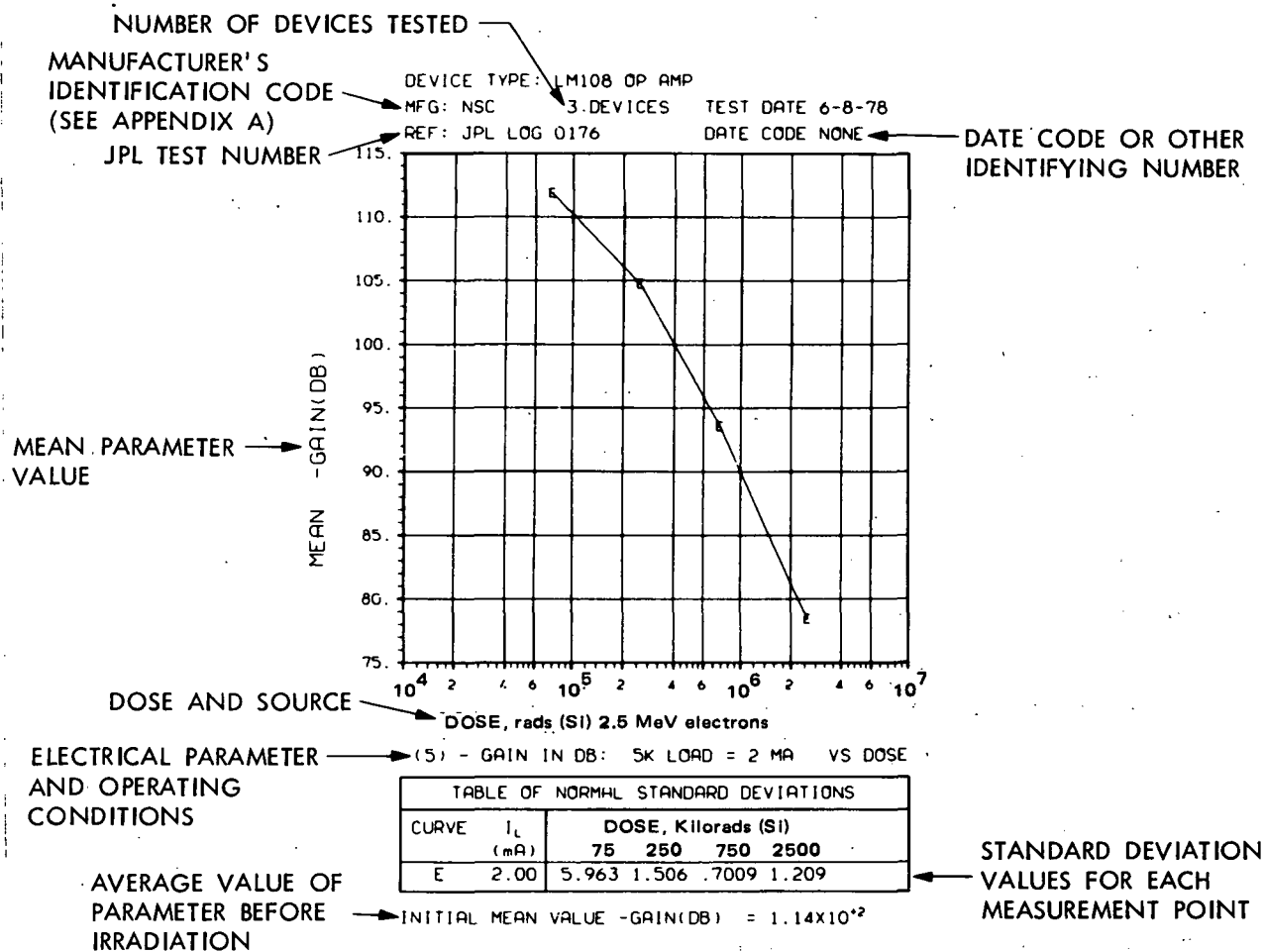


Figure 2. Description of Typical Graph Format

The narrative format is used to describe some of the tests of large-scale ICs (LSIs) because of the complexity of the parameter measurements and resultant difficulty in putting data into a computer for processing into curves.

DEVICE TYPE: 1802 CMOS Microprocessor
MFG: HUG/RCA 20 Devices
REF: JPL LOG 0747

TEST DATE: 8-3-81
DATE CODE: Below
SOURCE: Co⁶⁰, 1.25 MeV γ

Twenty standard process 1802 microprocessors were subjected to radiation tests at Boeing in August, 1981. These devices included 8 Hughes HMMP1802D screened to the manufacturer's internal hi-rel program (MIL-STD-883, Class B, with some exceptions), including a 168 hour static burn-in. Because of extremely long lead times quoted by RCA for their screened device, 12 commercial CDP1802D devices were used; these were subjected to a 168 hour static burn-in by Boeing prior to the radiation tests. The original test plan called for irradiating only 8 from each manufacturer, 4 at 10 volt bias and 4 at 0 volt bias, but one group of 4 RCA devices was inadvertently tested with no bias (inputs and power supply pins open) and an additional 4 devices were tested at the proper bias condition. The following is a summary of the 5 groups of 4 devices:

| Group | Mfr | Date Code (Qty) | Bias, V | Est. Rad Hardness, krad(Si) |
|-------|-----|------------------|------------|--------------------------------|
| 1 | HUG | 8111(2), 8112(2) | 10 | 8 |
| 2 | RCA | 819(4) | 10 | 6 |
| 3 | HUG | 8112(4) | 0 | 20 |
| 4 | RCA | 810(1), 724(3) | 0 | 20 |
| 5 | RCA | 819(4) | No Bias | 25 |

Radiation levels used were different for each group of parts.

These estimates are based on all parts passing functional tests and remaining within MIL-M-38510/470 specification limits on all parameters excluding those that appear to be anomalous measurements and one that was out of specification initially. Caution should be used in applying these results because significant lot-to-lot variation can be expected. In addition, both manufacturers are now using a redesigned mask set for the 1802; the parts reported on here were made with the old mask set.

DEVICE TYPE: 1821 CMOS-SOS RAM

MFG: RCA 4 Devices

REF: JPL LOG 0791

TEST DATE: 10-13-81

DATE CODE: SD832

SOURCE: Co⁶⁰, 1.25 MeV γ

Four samples of the RCA CDP1821D CMOS-SOS RAM, date code SD832, were radiation tested at BREL on 13 October 1981 per RTR 334. The radiation levels were 2, 4, 6, 8, 10, 12, 16, 20, 25, and 30 krad(Si). The dose rate was 53 rads(Si)/second.

Three of the lot failed at 16 krad(Si) and one at 20 krad(Si) when V_{DD} was 5 volts. When V_{DD} was 10 volts, three devices failed at 25 krad(Si), and one at 30 krad(Si).

DEVICE TYPE: 1824 CMOS 32 x 8 RAM

TEST DATE: 10-2-81

MFG: RCA 6 Devices

DATE CODE: 010

REF: JPL LOG 0763

SOURCE: Co⁶⁰, 1.25 MeV γ

Six samples of the RCA CDP1824D (Dip package) 32 x 8 RAM, date code 010, were radiation tested at BREL on 2 October 1981 per RTR 331. The radiation levels were 1, 3, 6, 10, 15 krad(Si). The dose rate was 53 rads(Si)/second.

The devices were tested at both 5 and 10 volts V_{DD} . With V_{DD} equal to 5 volts, two devices failed at 6 krad(Si) and the other four devices failed at 10 krad(Si). When operated with V_{DD} equal to 10 volts, one device failed at 6 krad(Si), and four more at 10 krad(Si). The last device failed at 15 krad(Si).

Most measured parameters indicated little or no change. The parameters which had noticeable change are listed in the table below.

Worst Case Values, Selected Parameters

| Total Dose, krad(Si) @ 53 rads(Si)/second | | | | | | |
|---|---------|---------|-------|------|------|------|
| Parameter | Units | Initial | 1 | 3 | 6 | 10 |
| $V_{IL}(5)$ | V | 2.27 | 2.13 | 1.86 | Fail | Fail |
| $V_{IL}(10)$ | V | 4.41 | 4.35 | 4.21 | Fail | Fail |
| $V_{IH}(5)$ | V | 2.28 | 2.14 | 1.87 | Fail | Fail |
| $V_{IH}(10)$ | V | 5.52 | 5.43 | 5.35 | Fail | Fail |
| $I_{DD}(5)$ | μA | 0.021 | 0.068 | 25.7 | 925 | 967 |
| $I_{DD}(10)$ | μA | 3.31 | 3.24 | 34.7 | 9690 | 6600 |

DEVICE TYPE: 1852 CMOS 8 Bit I/O Port

TEST DATE: 8-3-85

MFG: HUG 12 Devices

DATE CODE: H8023

REF: JPL LOG 0744

SOURCE: Co⁶⁰, 1.25 MeV γ

Twelve standard process 1852 8-bit input/output ports were subjected to radiation tests at Boeing in August, 1981. These 12 devices were Hughes HCMP1852D screened to the manufacturer's internal hi-rel program (MIL-STD-883 Class B equivalent). The original test plan called for 12 RCA CDP1852D devices to be tested along with the Hughes devices, but these parts were destroyed at Boeing before testing began. The test consisted of 3 groups of 4 devices each. Each group was irradiated at one of three bias levels: +10 V, +5 V, and 0 V. The following is a summary of the three groups.

Bias During Irradiation

| Group | Date Code (Qty) | Bias, V |
|-------|-----------------|---------|
| 1 | 8032 (4) | +10 |
| 2 | 8032 (4) | +5 |
| 3 | 8032 (4) | 0 |

Summary and Conclusions

The estimated radiation hardness of each group is listed below:

Group 1 \approx 5 krad(Si) (V_{DD} = +5 V AND V_{DD} = +10 V)

Group 2 \approx 6 krad(Si) (V_{DD} = +5 V AND V_{DD} = +10 V)

Group 3 \approx 16 krad(Si) (V_{DD} = +10 V)

Group 3 \approx 30 krad(Si) (V_{DD} = +5 V)

These estimates are based on all parts passing functional tests and remaining within MIL-M-38510/473 specification limits on all parameters. Caution should be used in applying these results as significant lot-to-lot variation can be expected.

DEVICE TYPE: 2909A* Microprocessor Prog. Seq. TEST DATE: 4-11-83
MFG: AMD 6 Devices DATE CODE: 8146DM
REF: JPL LOG 0979 SOURCE: Dynamitron, 2.5 MeV e⁻

Six samples of the AMD Microprogram Sequencer, date code 8146DM, were radiation tested at BREL (Boeing Radiation Effects Lab) on 11 April 1983. The devices were log number 0979 and were tested per RTR 360. The radiation levels were 30, 75, 150, 300, 600 krad(Si), and 1 Mrad(Si). The test device serial numbers were 40, 41, 42, 43, 44, and 45. Serial number 10046 was the control.

These devices are "hard" to at least 1 Mrad(Si). There were no failures noted and the maximum parametric charge, in most cases, was less than 5% after 1 Mrad(Si) irradiation.

*New Process

DEVICE TYPE: 54HC373 CMOS Latch

TEST DATE: 12-8-83

MFG: MTL 6 Devices

DATE CODE: 8324

REF: JPL LOG 1034

SOURCE: CO⁶⁰ 1.25 MeV γ

Radiation Bias:

Condition 1
(all inputs low)

Condition 2
(all inputs high)

Condition 3
(Tri-state)

V_{CC} = 5 Vdc
V_{IN} = 0
Enable High
Output Control Low

V_{CC} = 5 Vdc
V_{IN} = 5 Vdc
Enable High
Output Control Low

V_{CC} = 5 Vdc
V_{IN} = 0
Enable High
Output Control High
(Tri-state)
V_{OUT} = 250 k Ω to 5 Vdc

Outputs Open

Outputs Open

Results: Worst Case Parameter Values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 1 | | | | | | | | | |
| Initial | 0.96 | 4.45 | 0.004 | -7.25 | 17.94 | 3.2 | 2.9 | 2.1 | 0.8 |
| 0.5 | 0.90 | 4.45 | 0.004 | -7.27 | 18.40 | 2.5 | 2.5 | 1.6 | 1.0 |
| 1 | 0.83 | 4.45 | 0.004 | -7.20 | 18.58 | 3.4 | 1.6 | 3.4 | 2.0 |
| 2 | 0.79 | 4.44 | 0.004 | -7.08 | 19.00 | 2.9 | 2.9 | 87.8 | 39.4 |
| 5 | 1.35 | 4.42 | 0.004 | -6.57 | 19.94 | 3.4 | 2.0 | 25,330 | >1mA |
| 10 | 7.84 | 4.18 | 0.008 | -4.20 | 20.05 | 3.2 | 3.2 | >1mA | >1mA |
| Condition 2 | | | | | | | | | |
| Initial | 0.47 | 4.45 | 0.004 | -7.20 | 16.31 | 2.6 | 1.3 | 2.3 | 1.1 |
| 0.5 | 0.41 | 4.45 | 0.004 | -7.29 | 16.60 | 2.6 | 2.9 | 1.6 | 1.0 |
| 1 | 0.36 | 4.44 | 0.004 | -7.23 | 16.66 | 2.6 | 3.1 | 2.0 | 1.1 |
| 2 | 0.31 | 4.42 | 0.004 | -6.69 | 16.69 | 2.9 | 3.4 | 4.0 | 2.0 |
| 5 | 1.60 | 2.96 | 2.52 | +5.91 | 16.81 | 3.5 | 2.6 | 65.2 | 25.6 |
| 10 | 6.22 | 4.36 | 2.52 | -5.96 | -18.84 | 2.9 | -197 | 3,230 | 1,198 |
| Condition 3 | | | | | | | | | |
| Initial | 0.55 | 4.48 | 0.004 | -6.84 | 15.96 | 2.6 | 2.6 | 2.0 | 1.0 |
| 0.5 | 0.49 | 4.48 | 0.004 | -6.90 | 16.21 | 3.4 | 0.2 | 1.3 | 0.8 |
| 1 | 0.45 | 4.48 | 0.004 | -6.84 | 16.28 | 2.6 | 1.6 | 1.3 | 0.5 |
| 2 | 0.39 | 4.45 | 0.004 | -6.72 | 16.25 | 3.5 | 2.0 | 2.1 | 1.0 |
| 5 | 0.96 | 4.42 | 0.008 | 0.0 | 16.24 | 2.9 | 3.4 | 16.0 | 8.6 |
| 10 | 3.30 | 2.84 | 1.07 | 0.0 | 0.0 | 3.5 | 3.2 | 810 | 424 |

DEVICE TYPE: 54HC373 CMOS Latch

MFG: MTL 2 Devices

REF: JPL LOG 1056

TEST DATE: 5-18-84

DATE CODE: 8324

SOURCE: Co⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 4

V_{CC} = 5 Vdc

High Impedance State

4 inputs high,

4 inputs low

Outputs loaded (sink/source)

Condition 5

V_{CC} = 5 Vdc

Low Impedance State

4 inputs high,

4 inputs low

Outputs loaded (sink/source)

Results: Worst case parameter values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 4 | | | | | | | | | |
| Initial | 0.047 | 4.45 | 0.002 | -6.75 | 18.98 | 2.00 | 2.00 | 1.50 | 0.80 |
| 1 | 0.027 | 4.44 | 0.002 | -5.99 | 17.83 | 2.00 | 1.00 | 1.60 | 1.00 |
| 2 | 0.412 | 4.42 | 0.004 | -6.18 | 17.94 | 2.50 | 2.00 | 3.40 | 2.10 |
| 3 | 1.263 | 4.35 | 0.004 | -2.32 | 17.8 | 1.60 | 2.00 | 10.3 | 5.80 |
| 4 | 2.883 | 2.9 | 0.803 | 0.00 | 0.00 | 1.60 | 2.10 | 29.9 | 16.1 |
| 5 | 5.708 | 2.9 | 0.850 | 0.00 | 0.00 | 1.60 | 1.00 | 89.6 | 47.8 |
| 10 | >20.0 | 2.61 | 1.134 | 0.01 | 0.00 | >20mA | -151.00 | 4740.0 | 2320.0 |
| 15 | >20.0 | 1.03 | 0.598 | 2.00 | 0.02 | >20mA | >20mA | 46000.0 | 26000.0 |
| 20 | >20.0 | 0.04 | 0.035 | >20.0 | 0.10 | >20mA | >20mA | 3.4mA | 121600.0 |
| Condition 5 | | | | | | | | | |
| Initial | 0.046 | 4.45 | 0.002 | -6.74 | 16.18 | 2.00 | 2.10 | 1.60 | 0.80 |
| 1 | 0.026 | 4.44 | 0.002 | -6.44 | 16.48 | 2.40 | 1.00 | 2.60 | 1.60 |
| 2 | 0.117 | 4.44 | 0.002 | -6.30 | 16.54 | 2.60 | 1.10 | 47.4 | 28.4 |
| 3 | 0.619 | 2.95 | 0.002 | 3.32 | 16.50 | 2.60 | 2.10 | 1180.0 | 686.0 |
| 4 | 1.767 | 3.29 | 0.004 | 3.34 | -11.03 | 2.00 | 1.00 | 17020.0 | 10000.0 |
| 5 | 3.855 | 3.54 | 0.004 | -0.19 | -16.40 | 2.60 | 1.60 | 1mA | 65200.0 |
| 10 | >20.0 | 0.02 | 0.020 | 0.32 | 0.00 | >20mA | -167.7 | >20mA | 2.4mA |
| 15 | >20.0 | 0.02 | 0.023 | 9.45 | -2.43 | >20mA | >20mA | >20mA | 13.0mA |
| 20 | >20.0 | 0.02 | 0.070 | >20.0 | 0.04 | >20mA | >20mA | >20mA | 13.6mA |

DEVICE TYPE: 54HC373 CMOS Latch

TEST DATE: 12-06-83

MFG: NSC 6 Devices

DATE CODE: 8325

REF: JPL LOG 1033

SOURCE: CO⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 1
(all inputs low)

Condition 2
(all inputs high)

Condition 3
(Tri-state)

V_{CC} = 5 Vdc
V_{IN} = 0
Enable High
Output Control Low

V_{CC} = 5 Vdc
V_{IN} = 5 Vdc
Enable High
Output Control Low

V_{CC} = 5 Vdc
V_{IN} = 0
Enable High
Output Control High
(Tri-state)
V_{OUT} = 250 k Ω to 5 Vdc

Outputs Open

Outputs Open

Results: Worst Case Parameter Values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 1 | | | | | | | | | |
| Initial | 0.90 | 4.48 | 0.004 | -18.74 | 15.48 | 2.3 | 2.5 | 1.6 | 0.8 |
| 0.5 | 0.77 | 4.48 | 0.004 | -18.87 | 15.66 | 2.3 | 0.5 | 1.3 | 0.8 |
| 1 | 0.68 | 4.48 | 0.004 | -18.69 | 15.69 | 2.6 | 0.4 | 1.3 | 0.8 |
| 2 | 0.49 | 4.48 | 0.004 | -18.24 | 15.82 | 2.6 | 2.3 | 1.1 | 0.4 |
| 5 | 0.36 | 4.48 | 0.004 | -18.19 | 16.19 | 2.6 | 0.5 | 4,660.0 | >1mA |
| 10 | 0.47 | 4.48 | 0.004 | -17.66 | 17.21 | 1.6 | 2.3 | >1mA | >1mA |
| Condition 2 | | | | | | | | | |
| Initial | 0.92 | 4.48 | 0.004 | -19.02 | 14.71 | 2.3 | 2.1 | 1.1 | 0.8 |
| 0.5 | 0.84 | 4.48 | 0.004 | -18.91 | 14.86 | 2.6 | 1.0 | 1.3 | 0.8 |
| 1 | 0.75 | 4.48 | 0.004 | -18.56 | 14.86 | 2.3 | 2.1 | 1.1 | 0.8 |
| 2 | 0.59 | 4.48 | 0.004 | -18.53 | 15.00 | 1.6 | 2.0 | 1.1 | 0.8 |
| 5 | 0.65 | 4.48 | 0.004 | -18.07 | 15.30 | 2.5 | 0.4 | 1.5 | 1.0 |
| 10 | 1.00 | 4.45 | 0.004 | -17.22 | 15.65 | 2.3 | 2.3 | 2.2 | 1.0 |
| Condition 3 | | | | | | | | | |
| Initial | 0.69 | 4.48 | 0.004 | -19.08 | 15.44 | 1.6 | 2.6 | 1.3 | 1.0 |
| 0.5 | 0.58 | 4.48 | 0.004 | -19.04 | 15.63 | 2.3 | 2.3 | 1.0 | 0.8 |
| 1 | 0.48 | 4.48 | 0.004 | -18.74 | 15.63 | 2.4 | 1.3 | 1.5 | 0.8 |
| 2 | 0.33 | 4.48 | 0.004 | -18.73 | 15.78 | 1.6 | 2.3 | 1.1 | 0.8 |
| 5 | 0.98 | 4.48 | 0.004 | -18.44 | 16.09 | 2.6 | 1.1 | 1.5 | 1.0 |
| 10 | 1.42 | 4.45 | 0.004 | -17.79 | 16.36 | 2.9 | 2.6 | 2.5 | 1.6 |

DEVICE TYPE: 54HC373 CMOS Latch

MFG: NSC 2 Devices

REF: JPL LOG 1054

TEST DATE: 5-17-84

DATE CODE: R8323

SOURCE: Co⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 4

V_{CC} = 5 Vdc
High Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Condition 5

V_{CC} = 5 Vdc
Low Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Results: Worst case parameter values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 4 | | | | | | | | | |
| Initial | 0.35 | 4.48 | 0.004 | -15.2 | 15.30 | 2.10 | 2.00 | 1.60 | 0.80 |
| 1 | 0.25 | 4.45 | 0.002 | -15.38 | 15.74 | 2.00 | 2.30 | 1.60 | 0.80 |
| 2 | 0.35 | 4.45 | 0.002 | -14.84 | 15.72 | 2.30 | 1.50 | 1.50 | 0.80 |
| 3 | 1.04 | 4.45 | 0.004 | -15.20 | 15.48 | 2.60 | 2.30 | 2.60 | 1.50 |
| 4 | 2.10 | 4.44 | 0.002 | -13.46 | 15.72 | 2.10 | 2.00 | 3.40 | 2.30 |
| 5 | 3.41 | 4.44 | 0.004 | -14.78 | 15.16 | 2.70 | 2.10 | 5.50 | 4.30 |
| 10 | 12.6 | 4.33 | 0.010 | -12.39 | 15.21 | 2.00 | 2.30 | 102.4 | 69.2 |
| 15 | 19.6 | 3.86 | 0.011 | -1.04 | 14.64 | 2.30 | 1.30 | 890.0 | 598.0 |
| 20 | 23.3 | 2.63 | 0.84 | 0.01 | 0.00 | >20mA | 1.50 | 4050.0 | 2900.0 |
| 30 | 22.0 | 1.78 | 0.75 | 5.20 | 0.02 | >20mA | 1.60 | 29000.0 | 22200.0 |
| 40 | >20 | 0.05 | 0.034 | 7.60 | 0.05 | >20mA | 2.60 | 100000.0 | 75300.0 |
| 50 | | | | | | | | | |
| Condition 5 | | | | | | | | | |
| Initial | 0.411 | 4.48 | 0.004 | -15.21 | 15.14 | 2.9 | 1.3 | 1.6 | 0.80 |
| 1 | 0.293 | 4.45 | 0.004 | -14.14 | 15.36 | 2.1 | 2.0 | 1.3 | 0.80 |
| 2 | 0.271 | 4.45 | 0.004 | -15.32 | 15.44 | 2.6 | 2.0 | 13.5 | 10.5 |
| 3 | 0.526 | 4.45 | 0.004 | -14.07 | 15.50 | 2.6 | 1.1 | 1000.0 | 774.0 |
| 4 | 0.988 | 4.45 | 0.004 | -15.11 | 15.44 | 2.6 | 1.1 | 7360.0 | 5400.0 |
| 5 | 1.58 | 4.44 | 0.004 | -14.75 | 15.48 | 2.0 | 2.0 | 20950.0 | 14400.0 |
| 10 | 6.39 | 4.36 | 0.005 | -12.90 | 15.39 | 2.3 | 2.1 | 260000.0 | 140000.0 |
| 15 | 11.3 | 4.28 | 0.015 | -11.14 | 14.49 | 2.6 | 2.1 | 1.0mA | 640000.0 |
| 20 | 17.2 | 4.30 | 0.253 | -14.50 | -1.08 | 2.6 | 1.1 | >20mA | 1.7mA |
| 30 | 21.5 | 0.02 | 0.02 | 5.95 | 0.01 | >20mA | 1.5 | >20mA | >20mA |
| 40 | >20 | 0.02 | 0.025 | 12.10 | 0.01 | >20mA | 2.6 | >20mA | >20mA |
| 50 | | | | | | | | | |

DEVICE TYPE: 54HC373 CMOS Latch

MFG: NSC 2 Devices

REF: JPL LOG 1058

TEST DATE: 5-23-84

DATE CODE: R8325

SOURCE: Co⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 4

V_{CC} = 5 Vdc

High Impedance State

4 inputs high,

4 inputs low

Outputs loaded (sink/source)

Condition 5

V_{CC} = 5 Vdc

Low Impedance State

4 inputs high,

4 inputs low

Outputs loaded (sink/source)

Results: Worst case parameter values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 4 | | | | | | | | | |
| Initial | 0.87 | 4.48 | 0.004 | -18.53 | 14.76 | 2.90 | 1.30 | 1.60 | 0.50 |
| 1 | 0.69 | 4.48 | 0.004 | -18.53 | 14.83 | 2.90 | 2.30 | 1.60 | 0.80 |
| 2 | 0.54 | 4.48 | 0.002 | -18.42 | 14.95 | 2.60 | 2.00 | 1.90 | 0.80 |
| 3 | 0.44 | 4.48 | 0.002 | -18.12 | 14.94 | 2.30 | 2.30 | 1.60 | 0.80 |
| 4 | 0.47 | 4.48 | 0.002 | -18.14 | 15.14 | 2.60 | 1.60 | 1.60 | 0.80 |
| 5 | 0.69 | 4.48 | 0.002 | -18.06 | 15.14 | 2.10 | 2.60 | 1.60 | 0.80 |
| 10 | 4.11 | 4.44 | 0.004 | -16.76 | 15.3 | 2.30 | 2.00 | 2.00 | 1.00 |
| 15 | 8.11 | 4.36 | 0.008 | -15.08 | 14.94 | 2.00 | 1.30 | 7.10 | 5.80 |
| 20 | 12.7 | 4.30 | 0.01 | -13.58 | 14.75 | 2.00 | 2.00 | 43.3 | 36.2 |
| 30 | >20 | 2.88 | 0.915 | 0.00 | 0.00 | >20mA | -1.20 | 580.0 | 488.0 |
| 40 | >20 | 0.02 | 0.016 | 11.32 | 0.00 | >20mA | -1.40 | 10.6mA | 5.6mA |
| 50 | >20 | 2.84 | 0.766 | 2.22 | 0.01 | >20mA | 2.60 | 13690.0 | 10300.0 |
| Condition 5 | | | | | | | | | |
| Initial | 0.59 | 4.48 | 0.004 | -17.96 | 14.7 | 2.0 | 2.0 | 1.4 | 0.80 |
| 1 | 0.44 | 4.48 | 0.004 | -17.88 | 14.8 | 2.5 | 1.6 | 1.6 | 0.50 |
| 2 | 0.33 | 4.48 | 0.004 | -17.78 | 14.9 | 2.9 | 1.5 | 1.6 | 0.80 |
| 3 | 0.33 | 4.48 | 0.004 | -17.48 | 14.9 | 3.1 | 1.3 | 40.9 | 30.8 |
| 4 | 0.53 | 4.48 | 0.004 | -17.42 | 15.1 | 2.6 | 1.6 | 980.0 | 735.0 |
| 5 | 0.89 | 4.48 | 0.004 | -16.18 | 15.0 | 2.5 | 1.6 | 6040.0 | 4300.0 |
| 10 | 4.84 | 4.42 | 0.004 | -15.52 | 15.1 | 2.6 | 1.6 | 150000.0 | 76000.0 |
| 15 | 9.01 | 4.34 | 0.01 | -13.16 | 14.9 | 2.9 | 1.6 | 456000.0 | 223000.0 |
| 20 | 12.9 | 4.28 | 0.01 | -12.85 | 14.7 | 2.0 | 2.3 | 1.2mA | 730000.0 |
| 30 | >20 | 0.02 | 0.022 | 4.56 | 0.00 | >20mA | 2.0 | 4.6mA | 2.9mA |
| 40 | ***** | **** | ***** | ***** | ***** | ***** | ***** | ***** | ***** |
| 50 | >20 | 0.02 | 0.02 | 15.45 | 0.00 | >20mA | 0.00 | 18.2mA | 8.0mA |

DEVICE TYPE: 54HC373 CMOS Latch

MFG: NSC 6 Devices

REF: JPL LOG 1032

TEST DATE: 11-29-84

DATE CODE: 8323

SOURCE: CO⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 1
(all inputs low)

V_{CC} = 5 Vdc
V_{IN} = 0
Enable High
Output Control Low

Outputs Open

Condition 2
(all inputs high)

V_{CC} = 5 Vdc
V_{IN} = 5 Vdc
Enable High
Output Control Low

Outputs Open

Condition 3
(Tri-state)

V_{CC} = 5 Vdc
V_{IN} = 0
Enable High
Output Control High
(Tri-state)
V_{OUT} = 250 k Ω to 5 Vdc

Results: Worst Case Parameter Values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 1 | | | | | | | | | |
| Initial | 0.65 | 4.48 | 0.004 | -15.83 | 15.51 | 2.3 | 1.5 | 1.5 | 0.8 |
| 0.5 | 0.54 | 4.48 | 0.004 | -15.54 | 15.72 | 1.9 | 2.0 | 1.6 | 0.8 |
| 1 | 0.47 | 4.48 | 0.004 | -15.43 | 15.65 | 2.6 | 1.3 | 2.6 | 1.3 |
| 2 | 0.37 | 4.45 | 0.004 | -15.11 | 15.90 | 2.6 | 2.0 | 38.5 | 31.9 |
| 5 | 0.68 | 4.44 | 0.004 | -14.67 | 16.32 | 1.6 | 2.0 | 18,520 | >1mA |
| 10 | 9.92 | 4.44 | 0.004 | -14.15 | 16.84 | 2.3 | 2.0 | >1mA | >1mA |
| Condition 2 | | | | | | | | | |
| Initial | 0.48 | 4.48 | 0.004 | -16.05 | 14.86 | 1.6 | 1.6 | 1.6 | 1.0 |
| 0.5 | 0.44 | 4.48 | 0.004 | -15.76 | 14.75 | 2.3 | 2.0 | 1.5 | 1.0 |
| 1 | 0.38 | 4.48 | 0.004 | -15.58 | 14.75 | 216 | 1.6 | 1.6 | 1.0 |
| 2 | 0.36 | 4.45 | 0.004 | -15.26 | 14.83 | 2.5 | 1.6 | 1.6 | 1.0 |
| 5 | 1.11 | 4.44 | 0.004 | -14.66 | 14.49 | 2.0 | 2.0 | 4.1 | 2.9 |
| 10 | 1.36 | 4.44 | 0.004 | -13.87 | 15.24 | 2.0 | 1.6 | 47.2 | 37.5 |
| Condition 3 | | | | | | | | | |
| Initial | 0.39 | 4.44 | 0.004 | -15.79 | 15.05 | 2.3 | 2.0 | 1.6 | 1.0 |
| 0.5 | 0.32 | 4.48 | 0.004 | -15.45 | 15.06 | 2.6 | 1.0 | 1.9 | 0.8 |
| 1 | 0.28 | 4.45 | 0.004 | -15.10 | 15.03 | 2.6 | 1.1 | 1.6 | 1.3 |
| 2 | 0.25 | 4.45 | 0.004 | -15.08 | 14.23 | 2.6 | 2.0 | 2.6 | 1.6 |
| 5 | 1.01 | 4.44 | 0.004 | -14.69 | 15.31 | 1.6 | 2.3 | 10.9 | 8.1 |
| 10 | 1.28 | 4.44 | 0.004 | -14.09 | 15.55 | 2.0 | 1.6 | 178 | 129 |

DEVICE TYPE: 74HC373 CMOS Latch

MFG: RCA 2 Devices

REF: JPL LOG 1059

TEST DATE: 6-4-84

DATE CODE: 0325

SOURCE: Co⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 4

V_{CC} = 5 Vdc

High Impedance State

4 inputs high,

4 inputs low

Outputs loaded (sink/source)

Condition 5

V_{CC} = 5 Vdc

Low Impedance State

4 inputs high,

4 inputs low

Outputs loaded (sink/source)

Results: Worst case parameter values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 4 | | | | | | | | | |
| Initial | 0.005 | 4.48 | 0.002 | -15.92 | 17.34 | 2.10 | 1.30 | 1.30 | 0.50 |
| 1 | 0.003 | 4.48 | 0.002 | -15.89 | 17.51 | 2.00 | XXXX | 1.30 | 0.50 |
| 2 | 0.002 | 4.48 | 0.001 | -15.85 | 17.61 | 1.60 | 1.10 | 1.30 | 0.50 |
| 3 | 0.001 | 4.48 | 0.002 | -15.76 | 17.55 | 1.60 | 1.10 | 1.50 | 0.50 |
| 4 | 0.001 | 4.48 | 0.001 | -15.70 | 17.65 | 2.60 | 1.00 | 1.30 | 0.50 |
| 5 | 0.006 | 4.48 | 0.002 | -15.64 | 17.32 | 2.60 | 1.00 | 1.60 | 0.80 |
| 10 | 0.285 | 4.48 | 0.002 | -15.29 | 17.73 | 2.00 | 0.80 | 1.60 | 0.80 |
| 15 | 1.59 | 4.44 | 0.002 | -14.60 | 17.68 | 2.50 | 1.00 | 5.20 | 3.80 |
| 20 | 5.37 | 4.41 | 0.004 | -13.54 | 17.64 | 1.50 | 0.20 | 43.5 | 36.2 |
| 30 | 13.6 | 4.30 | 0.016 | -11.63 | 14.29 | 2.60 | 0.80 | 340.0 | 244.0 |
| 40 | >20 | 2.63 | 1.08 | 0.01 | 0.00 | >20mA | -0.70 | 4740.0 | 3400.0 |
| 60 | >20 | 2.36 | 0.769 | 0.02 | 0.02 | >20mA | -4.50 | >20mA | 20600.0 |
| Condition 5 | | | | | | | | | |
| Initial | 0.004 | 4.48 | 0.002 | -15.64 | 16.39 | 2.60 | 2.30 | 1.30 | 0.50 |
| 1 | 0.002 | 4.48 | 0.002 | -15.57 | 16.48 | 2.10 | 1.90 | 1.60 | 0.50 |
| 2 | 0.001 | 4.48 | 0.002 | -15.47 | 16.55 | 2.50 | 2.10 | 1.50 | 0.50 |
| 3 | 0.001 | 4.48 | 0.002 | -15.38 | 16.60 | 2.60 | 2.10 | 1.30 | 0.50 |
| 4 | 0.001 | 4.48 | 0.002 | -15.27 | 16.63 | 2.10 | 0.20 | 1.60 | 0.80 |
| 5 | 0.001 | 4.48 | 0.002 | -15.17 | 16.53 | 2.60 | 0.10 | 1.50 | 1.00 |
| 10 | 0.128 | 4.48 | 0.002 | -14.66 | 16.88 | 2.60 | 0.80 | 27.4 | 26.0 |
| 15 | 1.293 | 4.45 | 0.002 | -13.68 | 17.31 | 2.00 | 0.40 | 23000.0 | 21400.0 |
| 20 | 4.098 | 4.42 | 0.002 | -12.44 | 17.13 | 2.30 | 0.80 | 391000.0 | 340000.0 |
| 30 | 9.33 | 4.30 | 0.004 | -10.94 | 16.03 | 2.00 | 0.20 | 1.6mA | 1.2mA |
| 40 | >20 | 4.03 | 0.011 | -9.22 | 0.00 | >20mA | -20.2 | 6.1mA | 3.9mA |
| 60 | >20 | 0.02 | 0.014 | 1.78 | -0.07 | >20mA | -34.4 | 16.6mA | 6.5mA |

DEVICE TYPE: 74HC373 CMOS Latch

TEST DATE: 6-5-84

MFG: RCA 2 Devices

DATE CODE: D345

REF: JPL LOG 1061

SOURCE: Co⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 4

V_{CC} = 5 Vdc
High Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Condition 5

V_{CC} = 5 Vdc
Low Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Results: Worst case parameter values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|

Condition 4

| | | | | | | | | | |
|---------|------|------|-------|--------|-------|--------|-------|----------|----------|
| Initial | 0.42 | 4.48 | 0.002 | -16.37 | 16.24 | 1.50 | 0.50 | 0.80 | 0.40 |
| 40 | 14.0 | 4.43 | 0.004 | -11.82 | 15.14 | 1.60 | -0.30 | 175.4 | 145.8 |
| 50 | >20 | 3.94 | 0.008 | -0.85 | -1.47 | >20mA | 0.40 | 830.0 | 683.0 |
| 60 | >20 | 2.72 | 1.15 | 0.01 | 0.00 | >20mA | -28.7 | 2930.0 | 2600.0 |
| 70 | >20 | 2.59 | 0.94 | 0.01 | 0.01 | >20mA | -96.7 | 8000.0 | 6800.0 |
| 80 | >20 | 2.84 | 0.78 | 0.02 | 0.02 | >20mA | -18.6 | 14950.0 | 13300.0 |
| 90 | >20 | 2.15 | 0.77 | 0.02 | 0.02 | >20mA | 0.40 | 25600.0 | 21500.0 |
| 100 | >20 | 1.22 | 0.086 | 0.04 | 0.04 | >20mA | -11.9 | 40000.0 | 35800.0 |
| 110 | >20 | 0.25 | 0.049 | 0.04 | 0.04 | 1350.0 | -10.2 | 52000.0 | 46700.0 |
| 120 | >20 | 0.11 | 0.04 | 0.04 | 0.04 | 2.0 | -1.8 | 55000.0 | 53500.0 |
| 140 | >20 | 0.04 | 0.03 | 0.10 | 0.10 | 2.6 | -5.3 | 111000.0 | 101200.0 |

Condition 5

| | | | | | | | | | |
|---------|-------|------|-------|--------|-------|-------|--------|-------|--------|
| Initial | 0.18 | 4.48 | 0.002 | -16.13 | 16.36 | 1.00 | 0.40 | 0.80 | 0.40 |
| 40 | 12.08 | 4.28 | 0.004 | -11.18 | 16.06 | 1.50 | 0.40 | 1.5mA | 1.24mA |
| 50 | 19.63 | 3.40 | 0.01 | -2.02 | -0.57 | 2.10 | -48.9 | 3.4mA | 2.6mA |
| 60 | >20 | 0.02 | 0.01 | -9.44 | 0.00 | >20mA | -200.0 | 6.5mA | 4.24mA |
| 70 | >20 | 0.02 | 0.01 | 1.69 | -0.90 | >20mA | -280.0 | >20mA | 5.9mA |
| 80 | >20 | 0.02 | 0.01 | 2.31 | -0.90 | >20mA | -268.0 | >20mA | 7.4mA |
| 90 | >20 | 0.02 | 0.01 | 2.41 | -0.01 | >20mA | -176.0 | >20mA | 8.7mA |
| 100 | >20 | 0.02 | 0.01 | 3.16 | 0.04 | >20mA | -82.3 | >20mA | 9.9mA |
| 110 | >20 | 0.02 | 0.01 | 3.26 | 0.05 | >20mA | -26.5 | >20mA | 11.0mA |
| 120 | >20 | 0.02 | 0.01 | 3.20 | 0.08 | >20mA | -13.1 | >20mA | 12.1mA |
| 140 | >20 | 0.02 | 0.01 | 2.63 | 0.10 | >20mA | -10.2 | >20mA | 14.0mA |

DEVICE TYPE: 74HC373 CMOS Latch

TEST DATE: 5-17-84

MFG: SPI 2 Devices

DATE CODE: 8340

REF: JPL LOG 1043

SOURCE: Co⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 4

V_{CC} = 5 Vdc
High Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Condition 5

V_{CC} = 5 Vdc
Low Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Results: Worst case parameter values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 4 | | | | | | | | | |
| Initial | 0.649 | 4.48 | 0.004 | -8.68 | 15.82 | 2.00 | 2.30 | 1.50 | 0.40 |
| 1 | 0.518 | 4.48 | 0.002 | -7.94 | 16.06 | 2.00 | 1.00 | 1.60 | 0.40 |
| 2 | 0.414 | 4.45 | 0.002 | -7.98 | 15.95 | 2.60 | 2.30 | 2.30 | 0.80 |
| 3 | 0.323 | 4.45 | 0.002 | -7.83 | 15.78 | 2.90 | 2.30 | 3.40 | 0.80 |
| 4 | 0.261 | 4.45 | 0.002 | -7.85 | 16.28 | 2.90 | 1.50 | 6.40 | 1.60 |
| 5 | 0.328 | 4.44 | 0.002 | -7.76 | 16.30 | 2.30 | 2.00 | 14.20 | 3.40 |
| 10 | 0.921 | 4.44 | 0.002 | -7.49 | 16.39 | 2.60 | 2.30 | 30.80 | 7.10 |
| 15 | 16.84 | 4.30 | 0.008 | -5.78 | 15.50 | 2.00 | 1.30 | 1180.0 | 272.0 |
| 20 | >20 | 2.30 | 1.053 | -0.09 | 0.00 | >20mA | 1.60 | 21300.0 | 6800.0 |
| 30 | >20 | 0.31 | 0.776 | 0.16 | 0.02 | >20mA | 2.00 | 124000.0 | 46400.0 |
| 40 | >20 | 0.02 | 0.040 | 0.73 | 0.16 | >20mA | -1358.0 | 583000.0 | 240000.0 |
| Condition 5 | | | | | | | | | |
| Initial | 0.119 | 4.80 | 0.002 | -6.99 | 12.70 | 2.00 | 1.60 | 1.50 | 0.80 |
| 1 | 0.073 | 4.48 | 0.002 | -6.25 | 12.94 | 2.50 | 2.00 | 1.60 | 0.80 |
| 2 | 0.044 | 3.64 | 0.002 | 0.040 | 11.10 | 1.60 | 2.00 | 15.1 | 6.40 |
| 3 | 0.029 | 4.48 | 0.002 | -6.39 | 13.09 | 2.60 | 1.60 | 200.0 | 87.1 |
| 4 | 0.024 | 4.48 | 0.002 | -6.30 | 13.15 | 2.60 | 1.60 | 2210.0 | 941.0 |
| 5 | 0.071 | 4.45 | 0.002 | -6.22 | 13.22 | 2.30 | 2.10 | 15480.0 | 7300.0 |
| 10 | 0.304 | 4.44 | 0.002 | -6.03 | 13.25 | 2.00 | 1.30 | 68000.0 | 29000.0 |
| 15 | 6.859 | 4.06 | 0.012 | -4.77 | 12.26 | 2.60 | 1.50 | 2.0mA | 1.2mA |
| 20 | >20 | 2.65 | 0.025 | -3.44 | -3.53 | 2.00 | 2.10 | >20mA | 3.5mA |
| 30 | >20 | 0.02 | 0.130 | -1.20 | -2.70 | >20mA | 2.60 | >20mA | 15.0mA |
| 40 | >20 | 0.02 | 0.040 | 5.27 | -0.07 | >20mA | -1545.0 | >20mA | 12.0mA |

DEVICE TYPE: 74HC373 CMOS Latch

TEST DATE: 5-25-84

MFG: STX 2 Devices

DATE CODE: 8244

REF: JPL LOG 1057

SOURCE: Co⁶⁰, 1.25 MeV γ

Radiation Bias:

Condition 4

V_{CC} = 5 Vdc
High Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Condition 5

V_{CC} = 5 Vdc
Low Impedance State
4 inputs high,
4 inputs low
Outputs loaded (sink/source)

Results: Worst case parameter values, V_{CC} = 5 Vdc
IT-200 Automatic Tester

| Total Dose [krad(Si)] | I _{CC} (mA) | V _{OH} (V) | V _{OL} (V) | I _{OH} (mA) | I _{OL} (mA) | I _{IH} (nA) | I _{IL} (nA) | I _{OZH} (nA) | I _{OZL} (nA) |
|--------------------------|----------------------|---------------------|---------------------|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| Condition 4 | | | | | | | | | |
| Initial | 0.34 | 4.42 | 0.002 | -8.83 | 21.7 | 2.60 | 2.10 | 8.90 | 0.80 |
| 1 | 0.22 | 4.39 | 0.002 | -8.52 | 21.7 | 2.50 | 2.30 | 20.6 | 1.00 |
| 2 | 0.17 | 4.31 | 0.002 | -7.23 | 21.7 | 2.60 | 1.50 | 48.2 | 1.60 |
| 3 | 0.46 | 4.25 | 0.002 | -6.48 | 21.7 | 2.60 | 2.30 | 107.2 | 2.90 |
| 4 | 1.65 | 4.18 | 0.002 | 1.60 | 21.5 | 2.60 | 1.10 | 200.0 | 5.40 |
| 5 | 3.84 | 2.90 | 0.002 | 0.00 | -20.7 | 2.00 | 1.30 | 400.0 | 10.0 |
| 10 | >20 | 2.74 | 0.893 | 0.02 | 0.00 | >20mA | 1.60 | 6130.0 | 204.0 |
| 15 | >20 | 2.60 | 1.14 | 0.04 | 0.00 | >20mA | -1.40 | 35000.0 | 1781.0 |
| 20 | >20 | 1.53 | 0.908 | 0.34 | 0.00 | >20mA | -4.20 | 156000.0 | 10300.0 |
| 30 | >20 | 0.08 | 0.058 | 1.18 | 0.04 | >20mA | -6.60 | 703000.0 | 96800.0 |
| 40 | >20 | 0.02 | 0.016 | 2.36 | 0.15 | >20mA | -8.50 | 1.6mA | 340000.0 |
| 50 | | | | | | | | | |
| Condition 5 | | | | | | | | | |
| Initial | 0.569 | 4.48 | 0.002 | -8.81 | 21.64 | 2.00 | 1.10 | 1.60 | 0.80 |
| 1 | 0.384 | 4.48 | 0.002 | -8.68 | 21.62 | 2.00 | 2.30 | 1.60 | 0.80 |
| 2 | 0.251 | 4.45 | 0.002 | -8.05 | 21.58 | 2.10 | 2.00 | 7.50 | 5.80 |
| 3 | 0.162 | 4.44 | 0.002 | -7.73 | 21.58 | 2.60 | 2.30 | 320.0 | 112.1 |
| 4 | 0.112 | 4.44 | 0.002 | -7.58 | 21.58 | 2.00 | 1.10 | 3040.0 | 2100.0 |
| 5 | 0.088 | 4.42 | 0.002 | -7.40 | 21.58 | 2.00 | 1.60 | 11100.0 | 8000.0 |
| 10 | 0.811 | 3.04 | 0.002 | 5.29 | -16.54 | 1.60 | -12.9 | 346000.0 | 200100.0 |
| 15 | 6.69 | 4.03 | 0.004 | -5.25 | -14.42 | 2.00 | -27.6 | 2.2 | 1.6mA |
| 20 | >20 | 0.01 | 0.87 | -5.18 | 0.00 | 2.60 | -32.8 | 7.3 | 4.5mA |
| 30 | >20 | 0.01 | 0.005 | 0.76 | -0.56 | >20mA | -33.9 | >20mA | 10.4mA |
| 40 | >20 | 0.01 | 0.005 | 0.89 | -0.96 | >20mA | -33.9 | >20mA | 15.8mA |
| 50 | | | | | | | | | |

DEVICE TYPE: 9407X-1* Data Access Reg.
MFG: FSC 3 Devices
REF: JPL LOG 0954

TEST DATE: 4-8-83
DATE CODE: 8239
SOURCE: Dynamitron 2.5 MeV.e⁻

Three samples of the Fairchild Data Access Register, date code 8239, were radiation tested at BREL (Boeing Radiation Effects Lab) on 8 April 1983. The devices were log number 0954 and were tested per RTR 321. The radiation levels were 30, 75, 150, 300, and 600 krad(Si). The test device serial numbers were 93, 101, and 105. Serial number 10400 was the control.

These devices are hard to at least 600 krad(Si). There were no failures noted and the maximum parametric change, in most cases, was less than 5% after 600 krad(Si) irradiation.

*I²L Process

DEVICE TYPE: A101 Hyb. Preamp

TEST DATE: 9-29-81

MFG: AMP

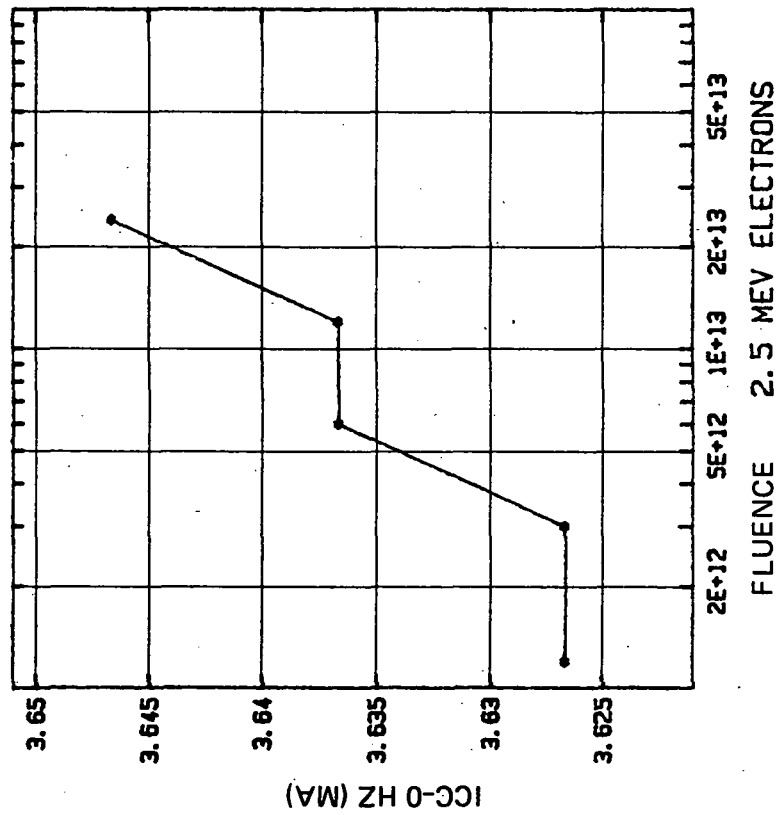
DATE CODE:

REF: JPL LOG 0759

SOURCE: Dynamitron, 2.5 MeV e⁻

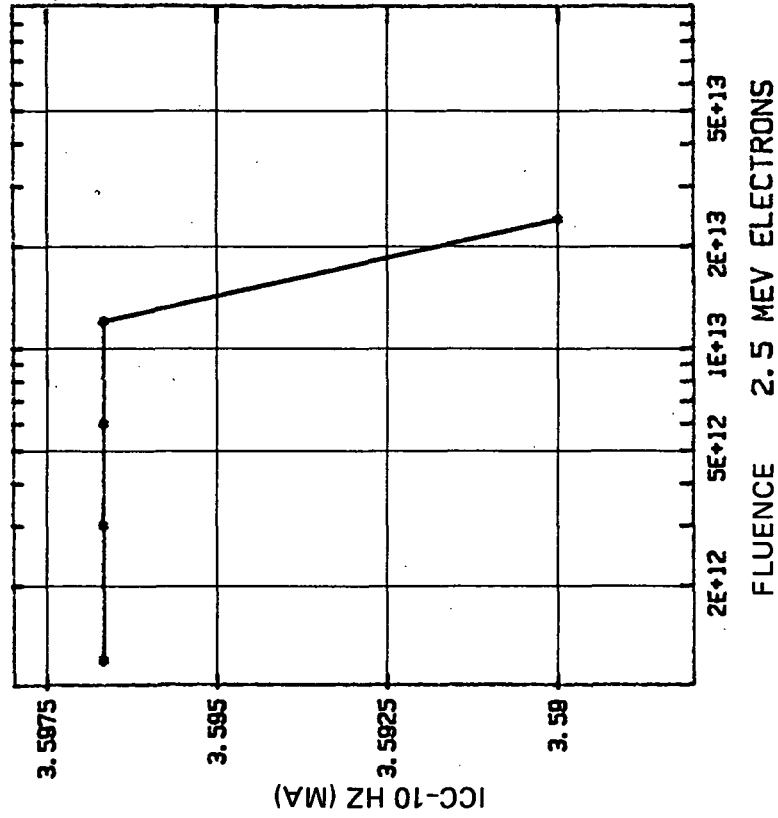
| Parameter | Units | Initial | 30 krad | 75 krad | 150 krad | 300 krad | 600 krad | Serial No. |
|--------------------------|-------|---------|---------|---------|----------|----------|----------|------------|
| I _{CC} -0 Hz | mA | 3.61 | 3.65 | 3.62 | 3.62 | 3.64 | 3.63 | 187 |
| I _{CC} -0 Hz | mA | 3.52 | 3.57 | 3.58 | 3.57 | 3.58 | 3.58 | 214 |
| I _{CC} -10 Hz | mA | 3.61 | 3.65 | 3.62 | 3.62 | 3.64 | 3.63 | 187 |
| I _{CC} -10 Hz | mA | 3.52 | 3.58 | 3.58 | 3.57 | 3.59 | 3.58 | 214 |
| I _{CC} -1 kHz | mA | 3.61 | 3.65 | 3.62 | 3.62 | 3.64 | 3.63 | 187 |
| I _{CC} -1 kHz | mA | 3.52 | 3.58 | 3.58 | 3.57 | 3.59 | 3.58 | 214 |
| I _{CC} -100 kHz | mA | 3.61 | 3.65 | 3.63 | 3.64 | 3.66 | 3.63 | 187 |
| I _{CC} -100 kHz | mA | 3.53 | 3.58 | 3.58 | 3.58 | 3.59 | 3.58 | 214 |
| Threshold 10 Hz | mV | 47 | 49 | 51 | 51 | 52 | 54 | 187 |
| Threshold 10 Hz | mV | 49 | 49 | 51 | 50 | 51 | 51 | 214 |
| Threshold 1 kHz | mV | 47 | 49 | 51 | 50 | 52 | 53 | 187 |
| Threshold 1 kHz | mV | 49 | 49 | 51 | 50 | 50 | 52 | 214 |
| Threshold 100 kHz | mV | 47 | 49 | 51 | 50 | 51 | 52 | 187 |
| Threshold 100 kHz | mV | 49 | 49 | 51 | 50 | 50 | 51 | 214 |

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-06-81
 REF: JPL LOG 0755 DATE CODE: -



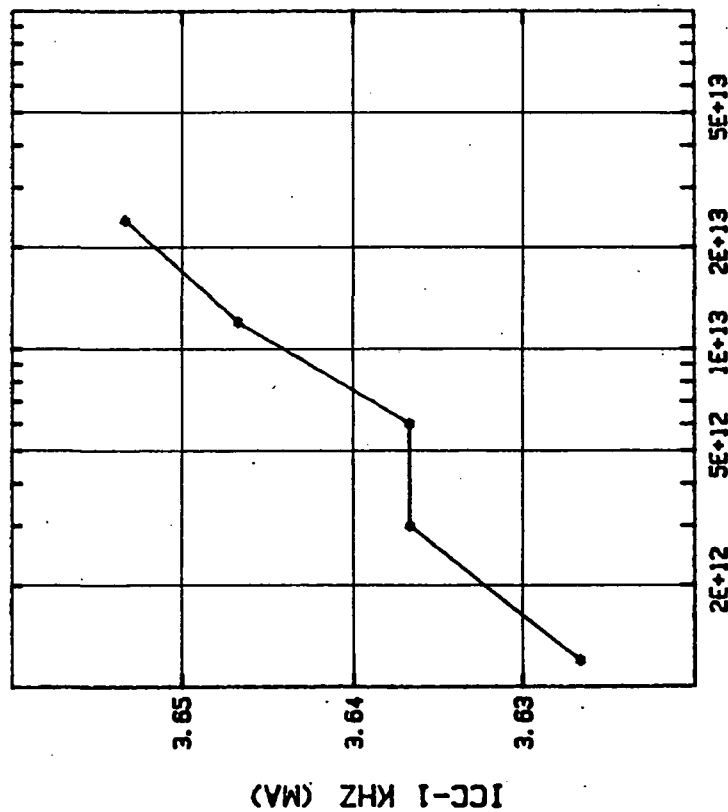
(1) ICC-0 HZ (MA) VS. DOSE
 INITIAL MEAN VALUE ICC-0 HZ (MA) = 3.616

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-06-81
 REF: JPL LOG 0755 DATE CODE: -



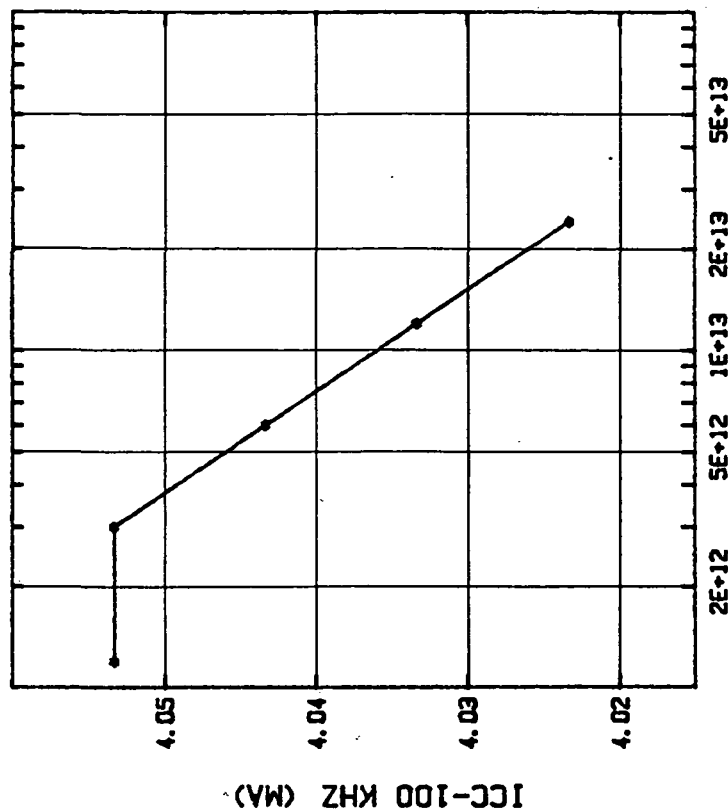
(2) ICC-10 HZ (MA) VS. DOSE
 INITIAL MEAN VALUE ICC-10 HZ (MA) = 3.583

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-06-81
 REF: JPL LOG 0755 DATE CODE: -



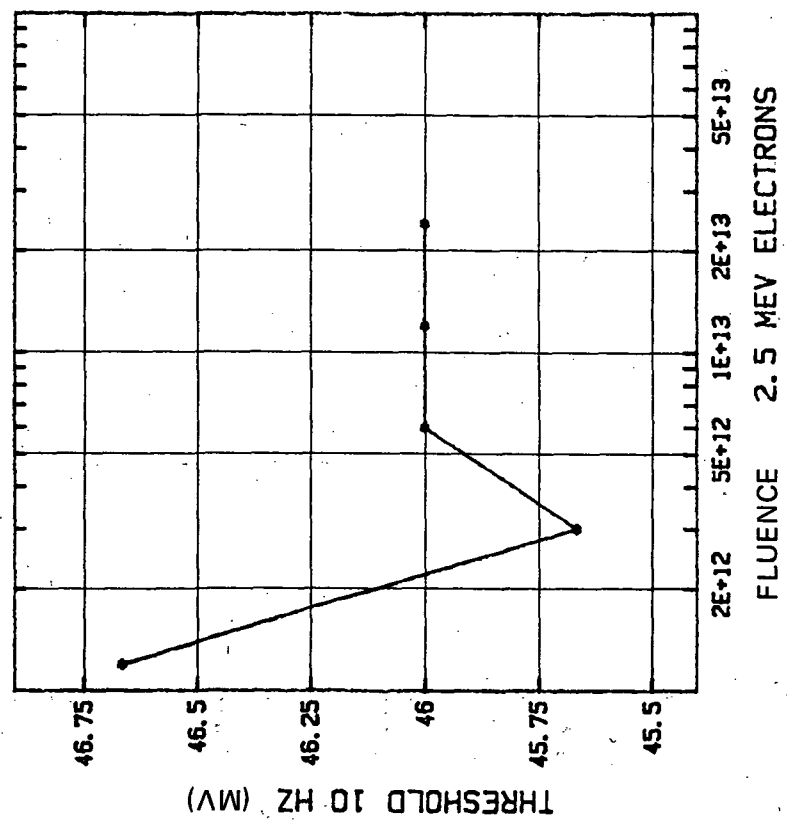
(3) ICC-1 KHZ (MA) VS. DOSE
 INITIAL MEAN VALUE ICC-1 KHZ (MA) - 3.623

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-06-81
 REF: JPL LOG 0755 DATE CODE: -



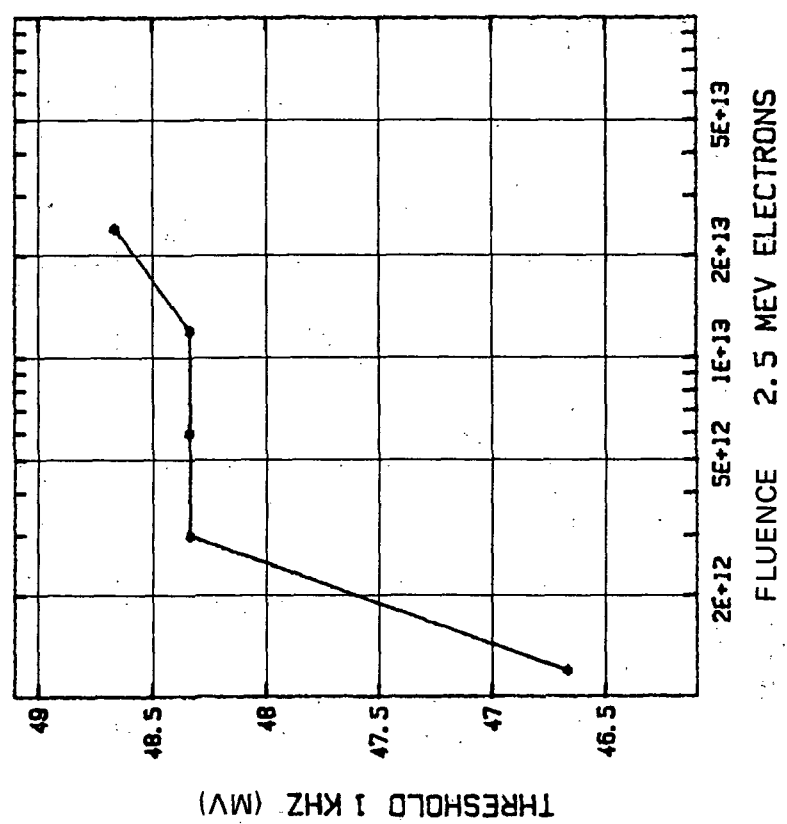
(4) ICC-100 KHZ (MA) VS. DOSE
 INITIAL MEAN VALUE ICC-100 KHZ (MA) - 4.07

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-06-81
 REF: JPL LOG 0755 DATE CODE: -



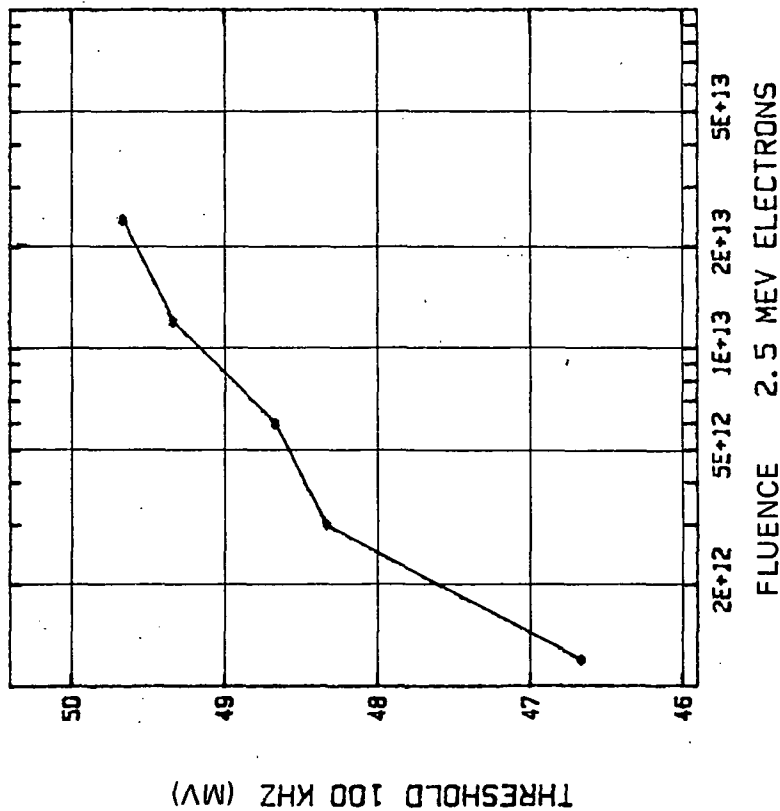
(5) THRESHOLD 10 HZ (MV) VS. DOSE
 INITIAL MEAN VALUE THRESHOLD 10 HZ (MV) = 46

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-06-81
 REF: JPL LOG 0755 DATE CODE: -



(6) THRESHOLD 1 KHZ (MV) VS. DOSE
 INITIAL MEAN VALUE THRESHOLD 1 KHZ (MV) = 45.66

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-06-81
 REF: JPL LOG 0755 DATE CODE: -

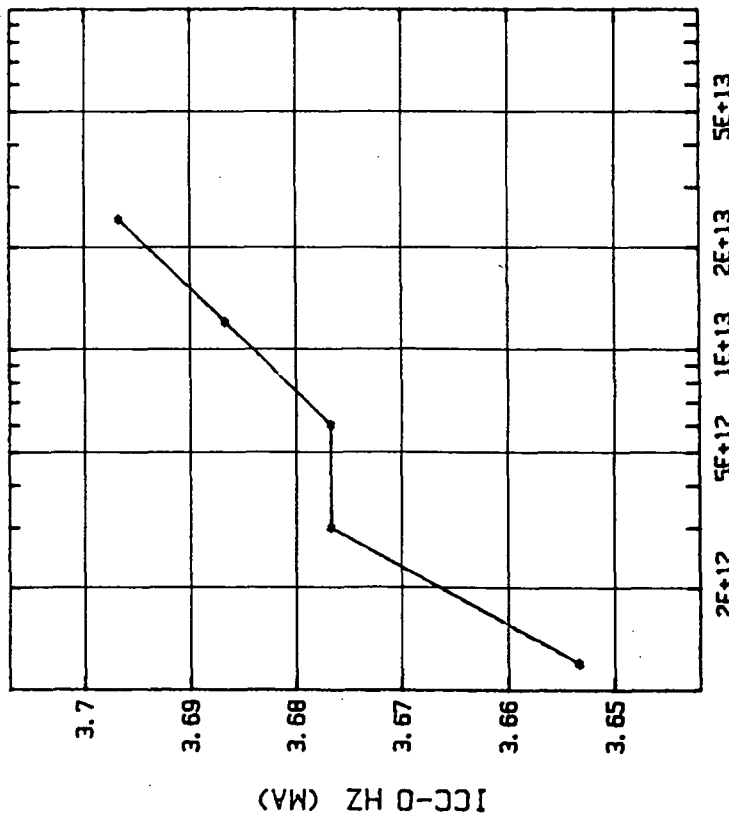


(7) THRESHOLD 100 KHZ (MV) VS. DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (Si) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| 2.309 | 2.886 | 2.309 | 2.886 | 4.041 |

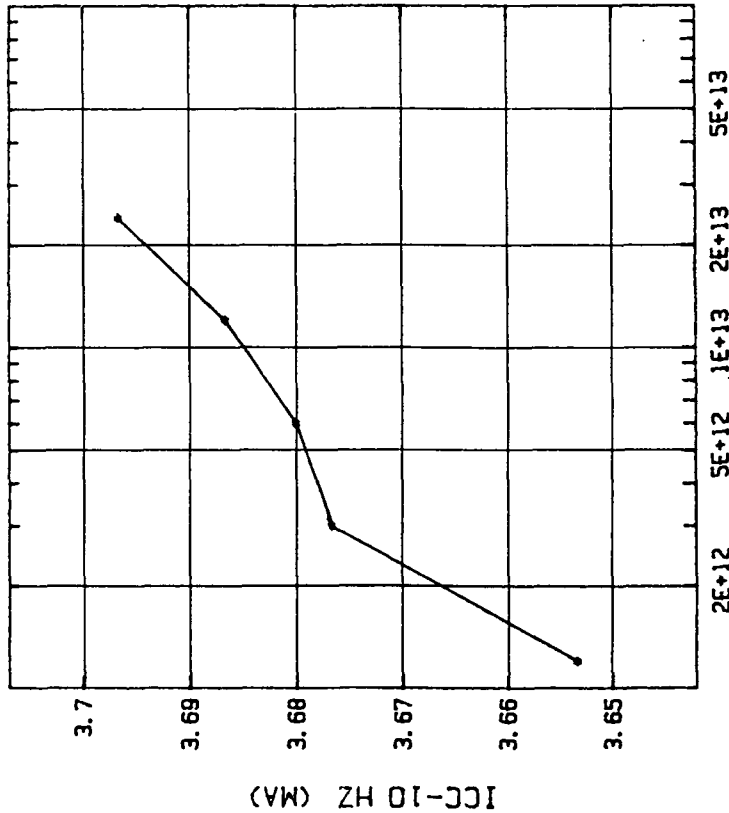
INITIAL MEAN VALUE THRESHOLD 100 KHZ (MV) = 47

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-8-81
 REF: JPL LOG 0754 DATE CODE: -



(1) ICC-0 HZ (MA) VS. DOSE
 INITIAL MEAN VALUE ICC-0 HZ (MA) = 3.666

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-8-81
 REF: JPL LOG 0754 DATE CODE: -

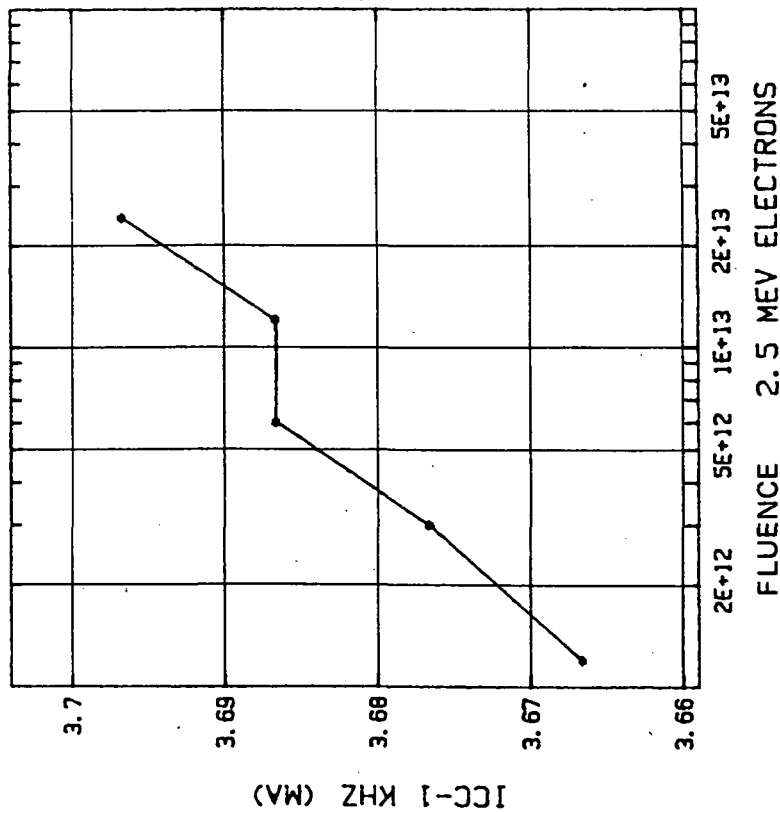


(2) ICC-10 HZ (MA) VS. DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (SI) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| .0577 | .0461 | .0519 | .0461 | .0461 |

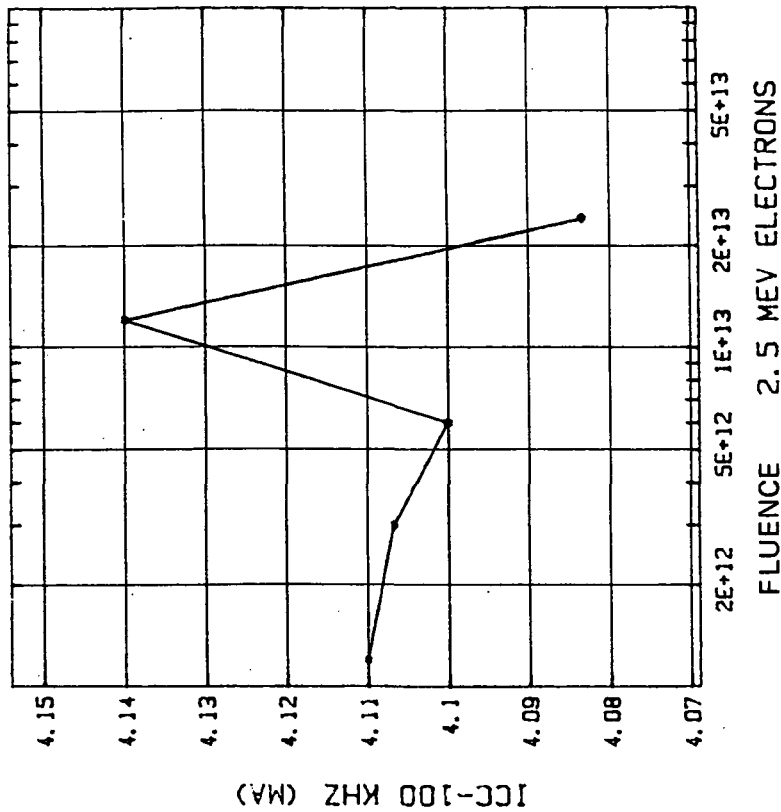
INITIAL MEAN VALUE ICC-10 HZ (MA) = 3.666

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-8-81
 REF: JPL LOG 0754 DATE CODE: -



(3) ICC-1 KHZ (MA) VS. DOSE
 INITIAL MEAN VALUE ICC-1 KHZ (MA) = 3.666

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-8-81
 REF: JPL LOG 0754 DATE CODE: -

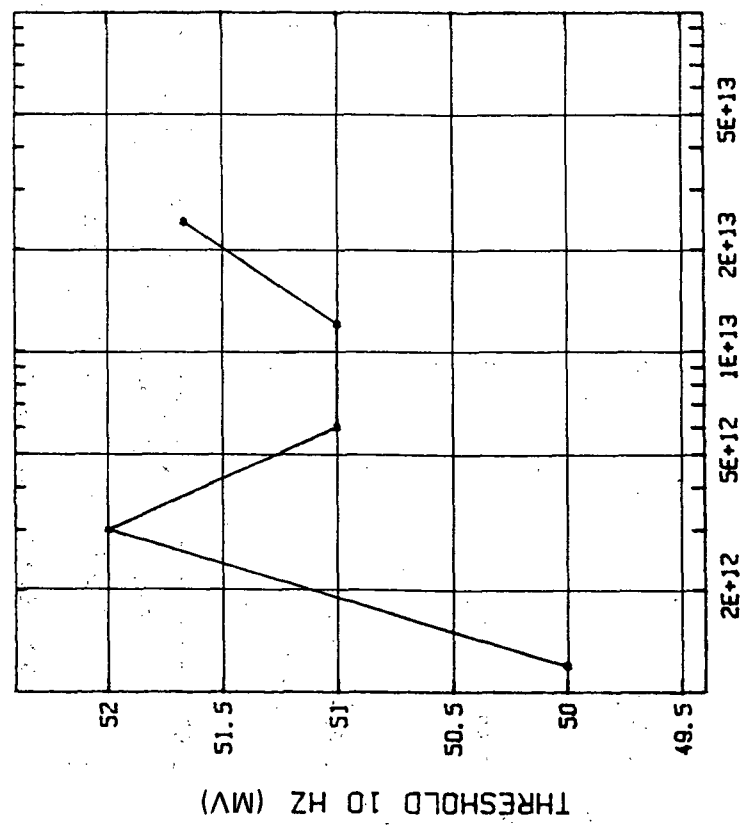


(4) ICC-100 KHZ (MA) VS. DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (SI) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| .0346 | .0288 | .0346 | .0346 | .0404 |

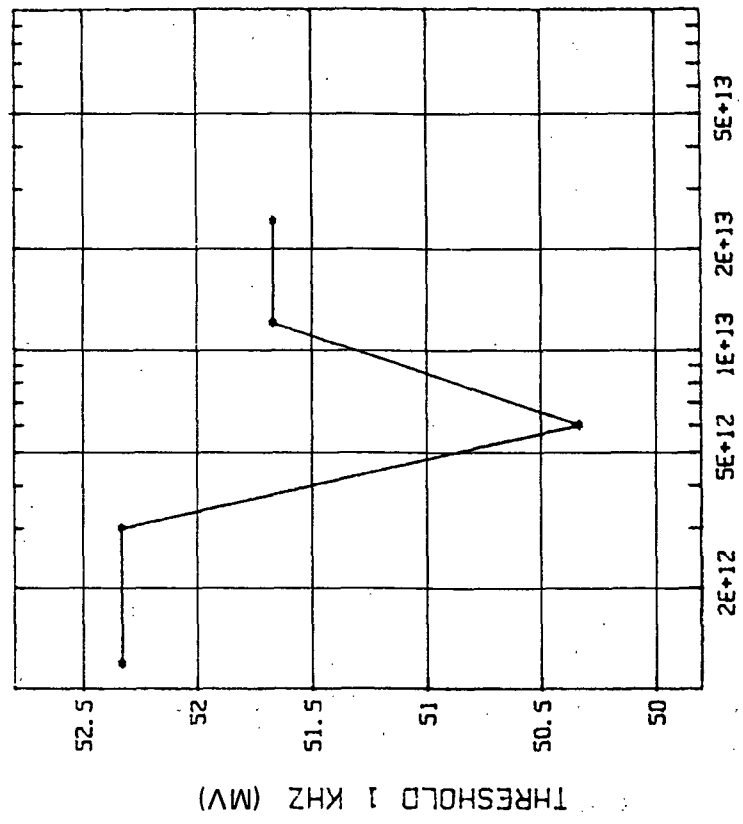
INITIAL MEAN VALUE ICC-100 KHZ (MA) = 4.09

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-8-81
 REF: JPL LOG 0754 DATE CODE: -



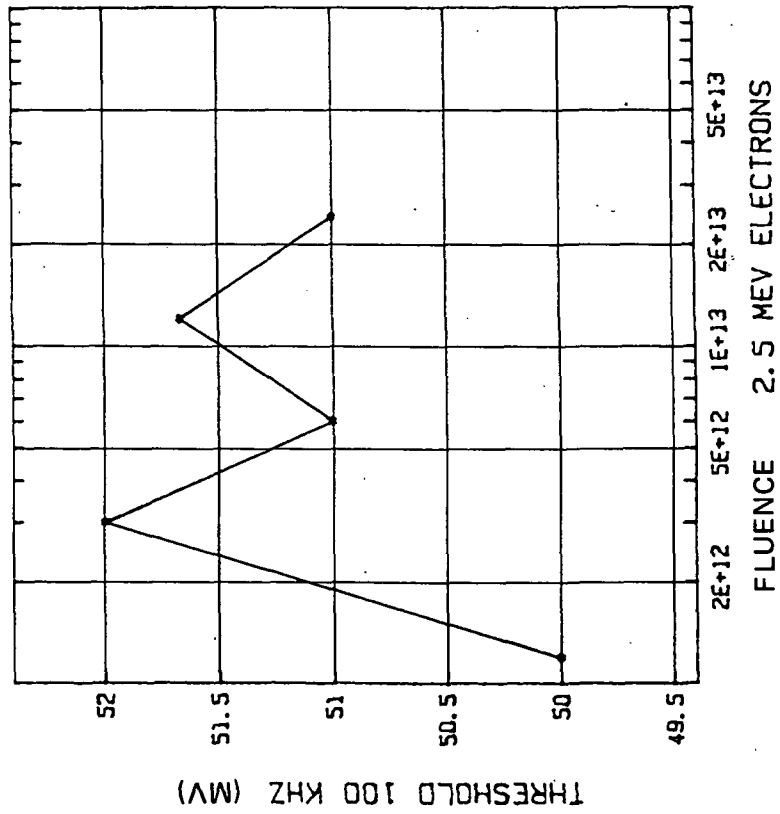
(5) THRESHOLD 10 HZ (MV) VS. DOSE
 INITIAL MEAN VALUE THRESHOLD 10 HZ (MV) = 50.66

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-8-81
 REF: JPL LOG 0754 DATE CODE: -



(6) THRESHOLD 1 KHZ (MV) VS. DOSE
 INITIAL MEAN VALUE THRESHOLD 1 KHZ (MV) = 49.66

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 3 DEVICE(S) TEST DATE: 10-8-81
 REF: JPL LOG 0754 DATE CODE: -



(7) THRESHOLD 100 KHZ (MV) VS. DOSE
 INITIAL MEAN VALUE THRESHOLD 100 KHZ (MV) = 50.66

DEVICE TYPE: A101 Hyb. Preamp

TEST DATE: 10-8-81

MFG: AMP

DATE CODE:

REF: JPL LOG 0758

SOURCE: Dynamitron, 2.5 MeV e⁻

| Parameter | Units | Initial | 30 krad | 75 krad | 150 krad | 300 krad | 600 krad | Serial No. |
|--------------------------|-------|---------|---------|---------|----------|----------|----------|------------|
| I _{CC} -0 Hz | mA | 3.61 | 3.62 | 3.62 | 3.63 | 3.63 | 3.64 | 177 |
| I _{CC} -0 Hz | mA | 3.71 | 3.72 | 3.73 | 3.73 | 3.74 | 3.75 | 207 |
| I _{CC} -10 Hz | mA | 3.61 | 3.62 | 3.62 | 3.63 | 3.63 | 3.64 | 177 |
| I _{CC} -10 Hz | mA | 3.72 | 3.72 | 3.73 | 3.73 | 3.74 | 3.75 | 207 |
| I _{CC} -1 kHz | mA | 3.62 | 3.62 | 3.63 | 3.63 | 3.64 | 3.65 | 177 |
| I _{CC} -1 kHz | mA | 3.72 | 3.72 | 3.73 | 3.74 | 3.74 | 3.75 | 207 |
| I _{CC} -100 kHz | mA | 4.05 | 4.03 | 4.03 | 4.03 | 4.03 | 4.02 | 177 |
| I _{CC} -100 kHz | mA | 4.15 | 4.13 | 4.12 | 4.13 | 4.13 | 4.13 | 207 |
| Threshold 10 Hz | mV | 63 | 63 | 64 | 67 | 63 | 65 | 177 |
| Threshold 10 Hz | mV | 56 | 56 | 59 | 57 | 61 | 59 | 207 |
| Threshold 1 kHz | mV | 60 | 62 | 63 | 65 | 63 | 63 | 177 |
| Threshold 1 kHz | mV | 55 | 56 | 56 | 58 | 57 | 58 | 207 |
| Threshold 100 kHz | mV | 61 | 64 | 65 | 65 | 64 | 64 | 177 |
| Threshold 100 kHz | mV | 57 | 56 | 57 | 57 | 58 | 58 | 207 |

DEVICE TYPE: A101 Hyb. Preamp

TEST DATE: 10-12-81

MFG: AMP

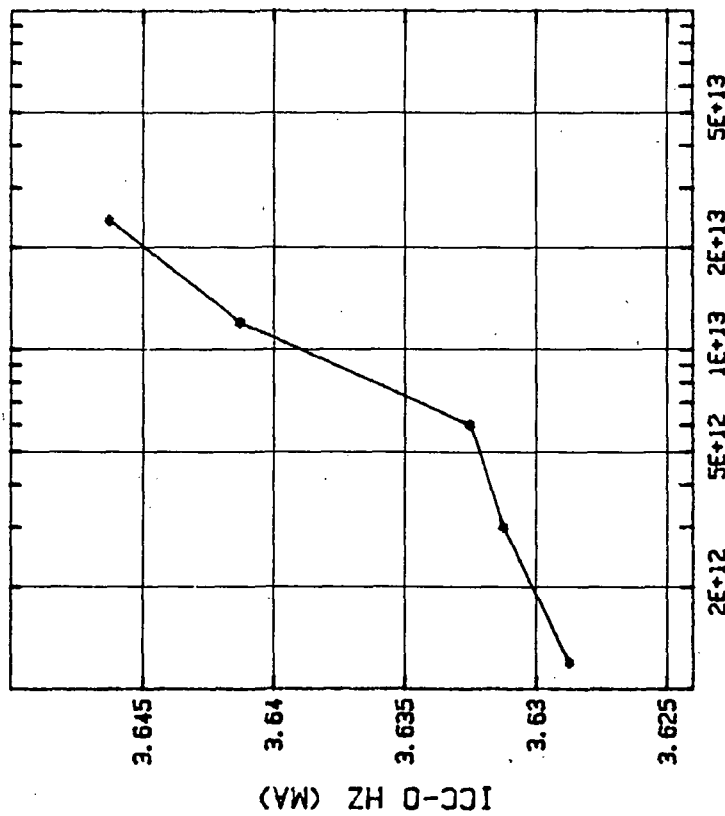
DATE CODE:

REF: JPL LOG 0757

SOURCE: Dynamitron, 2.5 MeV e⁻

| Parameter | Units | Initial | 30 krad | 75 krad | 150 krad | 300 krad | 600 krad | Serial No. |
|--------------------------|-------|---------|---------|---------|----------|----------|----------|------------|
| I _{CC} -0 Hz | mA | 3.57 | 3.57 | 3.58 | 3.58 | 3.59 | 3.59 | 174 |
| I _{CC} -0 Hz | mA | 3.57 | 3.57 | 3.58 | 3.58 | 3.59 | 3.60 | 188 |
| I _{CC} -10 Hz | mA | 3.57 | 3.57 | 3.58 | 3.58 | 3.59 | 3.59 | 174 |
| I _{CC} -10 Hz | mA | 3.57 | 3.57 | 3.58 | 3.58 | 3.59 | 3.60 | 188 |
| I _{CC} -1 kHz | mA | 3.57 | 3.57 | 3.58 | 3.58 | 3.59 | 3.59 | 174 |
| I _{CC} -1 kHz | mA | 3.58 | 3.58 | 3.58 | 3.59 | 3.59 | 3.60 | 188 |
| I _{CC} -100 kHz | mA | 3.57 | 3.57 | 3.66 | 3.59 | 3.59 | 3.60 | 174 |
| I _{CC} -100 kHz | mA | 4.00 | 3.99 | 3.99 | 3.97 | 3.97 | 3.95 | 188 |
| Threshold 10 Hz | mV | 57 | 57 | 59 | 58 | 58 | 57 | 174 |
| Threshold 10 Hz | mV | 58 | 59 | 60 | 60 | 62 | 61 | 188 |
| Threshold 1 kHz | mV | 54 | 56 | 56 | 57 | 57 | 57 | 174 |
| Threshold 1 kHz | mV | 58 | 59 | 59 | 60 | 60 | 60 | 188 |
| Threshold 100 kHz | mV | 55 | 56 | 58 | 56 | 58 | 58 | 174 |
| Threshold 100 kHz | mV | 57 | 59 | 60 | 60 | 60 | 61 | 188 |

DEVICE TYPE: A101 HYB. PREAMP
MFG: AMP 8 DEVICE(S) TEST DATE: 10-27-81
REF: JPL LOG 0756 DATE CODE: -

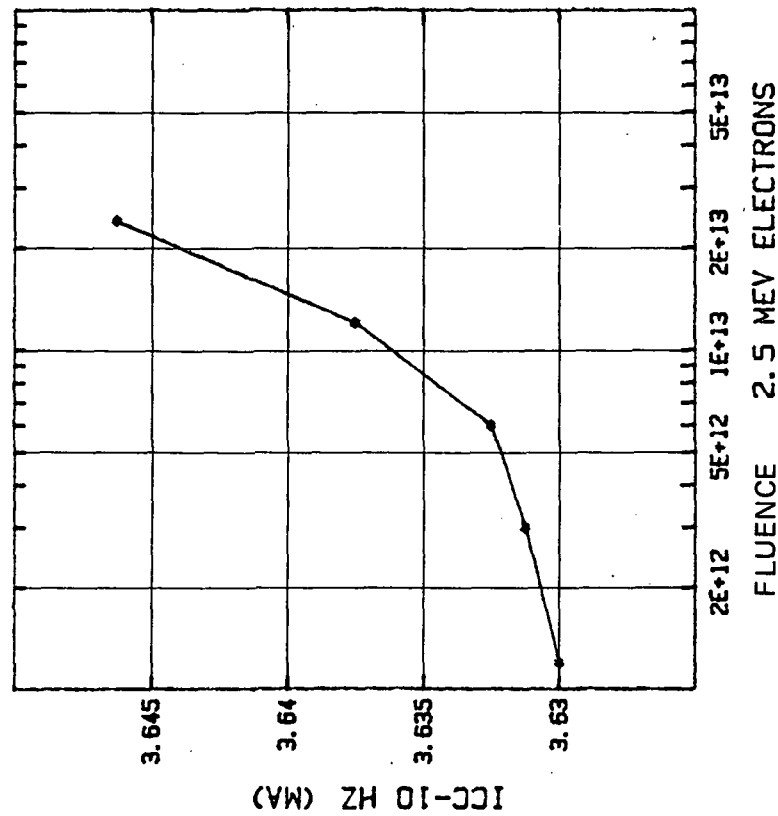


(1) ICC-0 HZ (MA) VS. DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (SI) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| .0559 | .0546 | .0570 | .0559 | .0592 |

INITIAL MEAN VALUE ICC-0 HZ (MA) = 3.615

DEVICE TYPE: A101 HYB. PREAMP
MFG: AMP 8 DEVICE(S) TEST DATE: 10-27-81
REF: JPL LOG 0756 DATE CODE: -



(2) ICC-10 HZ (MA) VS. DOSE

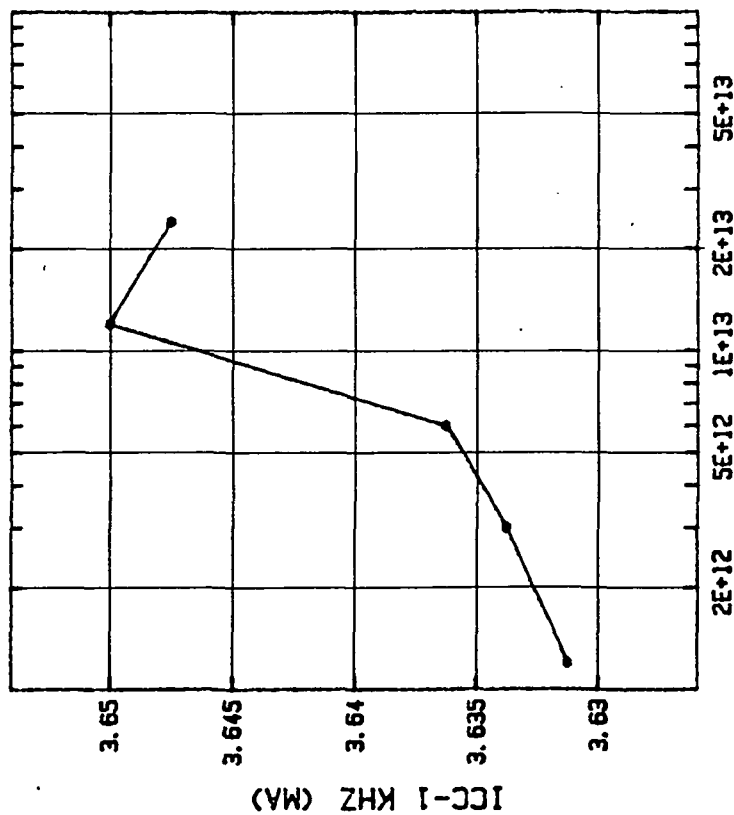
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (SI) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| .0545 | .0546 | .0570 | .0580 | .0592 |

INITIAL MEAN VALUE ICC-10 HZ (MA) = 3.615

DEVICE TYPE: A101 HYB. PREAMP

MFG: AMP 8 DEVICE(S) TEST DATE: 10-27-81

REF: JPL LOG 0756 DATE CODE: -



(3) ICC-1 KHZ (MA) VS. DOSE

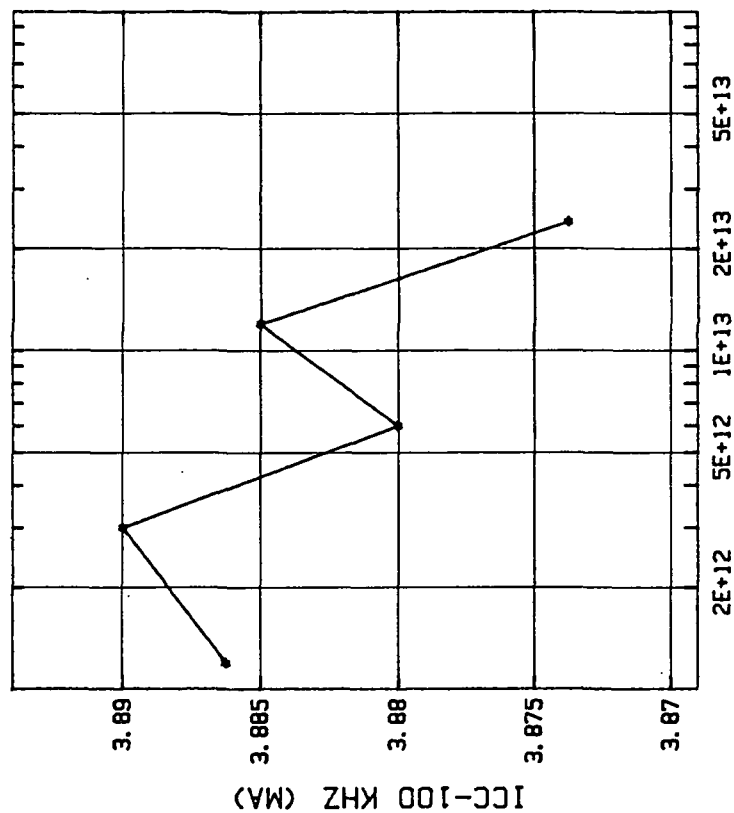
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (SI) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| .0530 | .0555 | .0592 | .0599 | .0592 |

INITIAL MEAN VALUE ICC-1 KHZ (MA) = 3.618

DEVICE TYPE: A101 HYB. PREAMP

MFG: AMP 8 DEVICE(S) TEST DATE: 10-27-81

REF: JPL LOG 0756 DATE CODE: -



(4) ICC-100 KHZ (MA) VS. DOSE

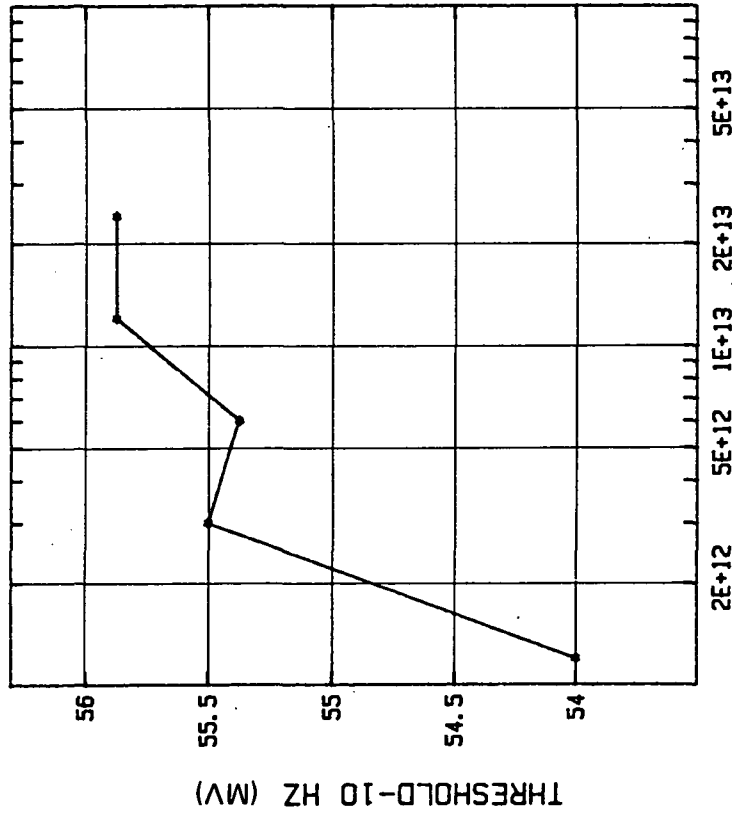
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (SI) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| .2419 | .2248 | .2353 | .2305 | .2297 |

INITIAL MEAN VALUE ICC-100 KHZ (MA) = 3.881

DEVICE TYPE: A101 HYB. PREAMP

MFG: AMP 8 DEVICE(S) TEST DATE: 10-27-81

REF: JPL LOG 0756 DATE CODE: -



THRESHOLD-10 HZ (MV)

2E+12 5E+12 1E+13 2E+13 5E+13
FLUENCE 2.5 MEV ELECTRONS

(5) THRESHOLD-10 HZ (MV) VS. DOSE

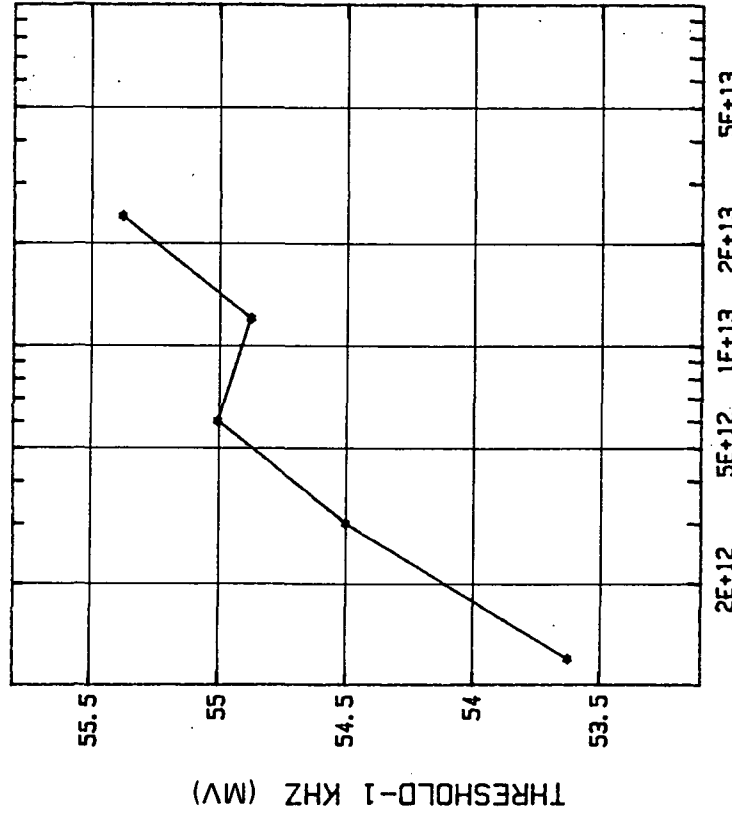
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (Si) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| 5.477 | 5.580 | 6.232 | 5.693 | 5.566 |

INITIAL MEAN VALUE THRESHOLD-10 HZ (MV) = 53.62

DEVICE TYPE: A101 HYB. PREAMP

MFG: AMP 8 DEVICE(S) TEST DATE: 10-27-81

REF: JPL LOG 0756 DATE CODE: -



THRESHOLD-1 KHZ (MV)

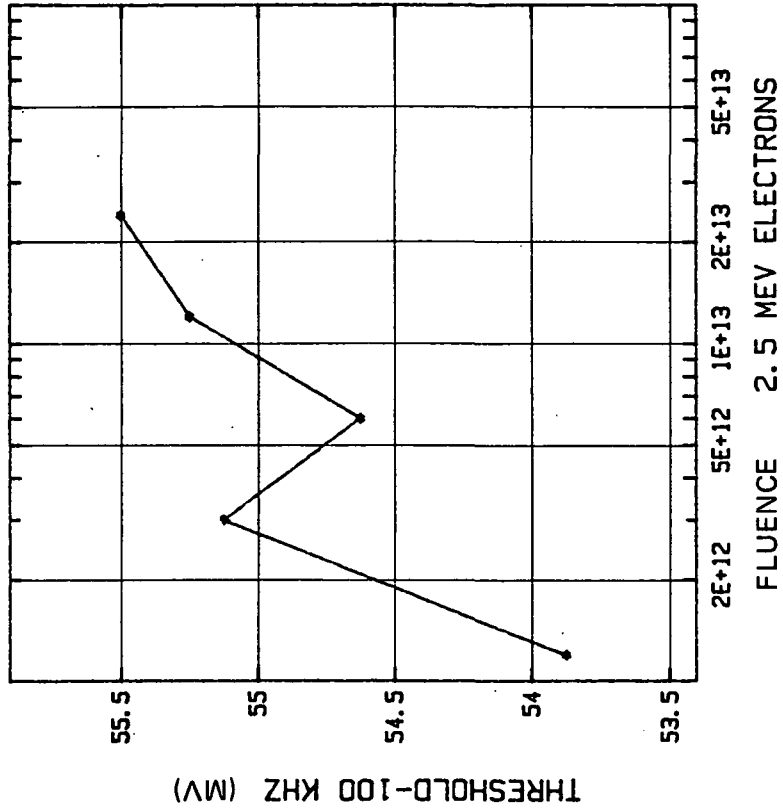
2E+12 5E+12 1E+13 2E+13 5E+13
FLUENCE 2.5 MEV ELECTRONS

(6) THRESHOLD-1 KHZ (MV) VS. DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (Si) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| 5.316 | 4.810 | 5.830 | 5.083 | 4.838 |

INITIAL MEAN VALUE THRESHOLD-1 KHZ (MV) = 52.62

DEVICE TYPE: A101 HYB. PREAMP
 MFG: AMP 8 DEVICE(S) TEST DATE: 10-27-81
 REF: JPL LOG 0756 DATE CODE: -



(7) THRESHOLD-100 KHZ (MV) VS. DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|-------|-------|--------|--------|
| FLUENCE ELECTRONS (SI) | | | | |
| 1.2E12 | 3E12 | 6E12 | 1.2E13 | 2.4E13 |
| 5.792 | 5.743 | 5.853 | 5.418 | 5.451 |

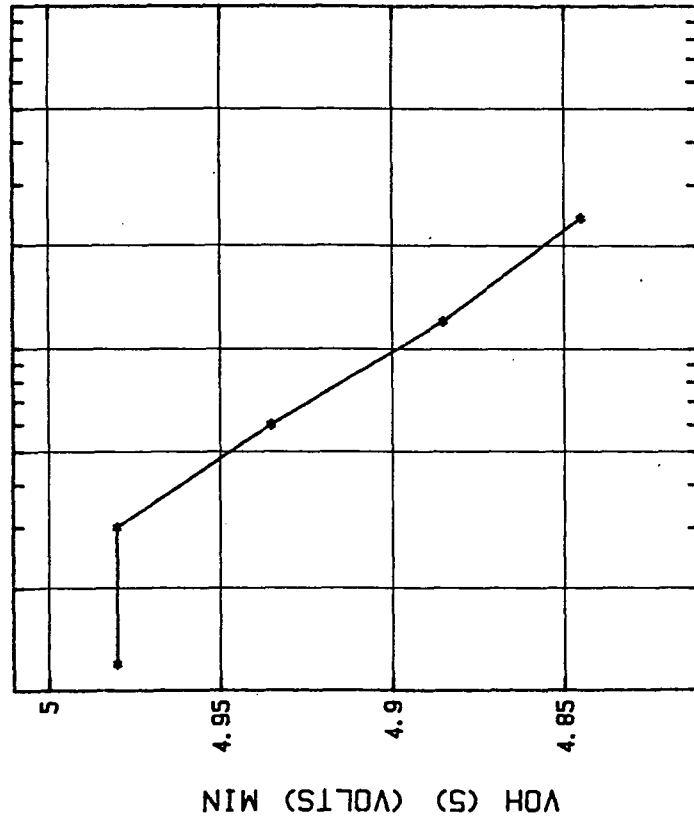
INITIAL MEAN VALUE THRESHOLD-100 KHZ (MV) = 52.87

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



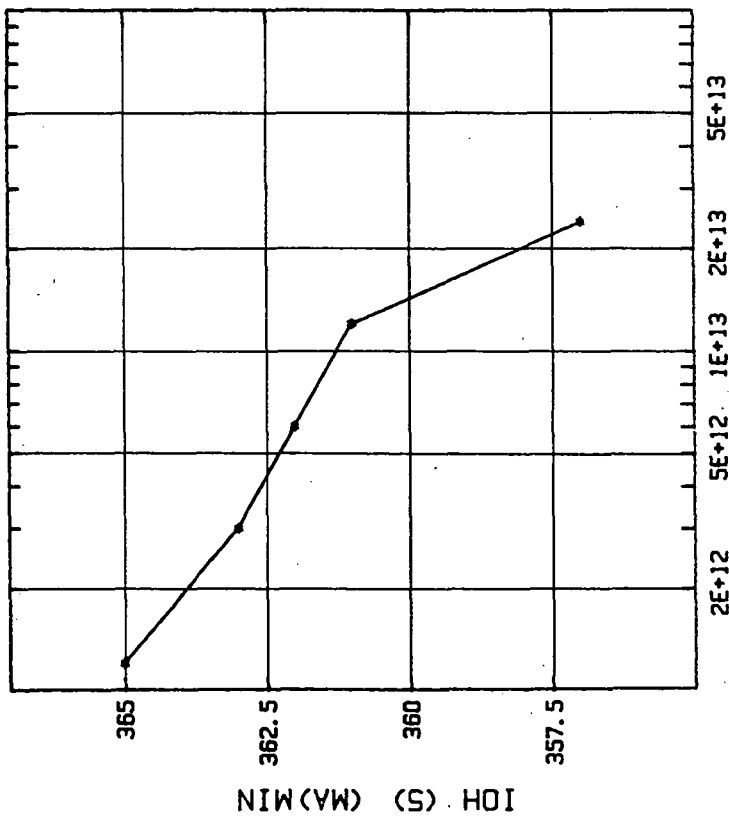
(2) VOL (S) (MV) MAX VS. DOSE
 INITIAL MEAN VALUE VOL (S) (MV) MAX = 39.9

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



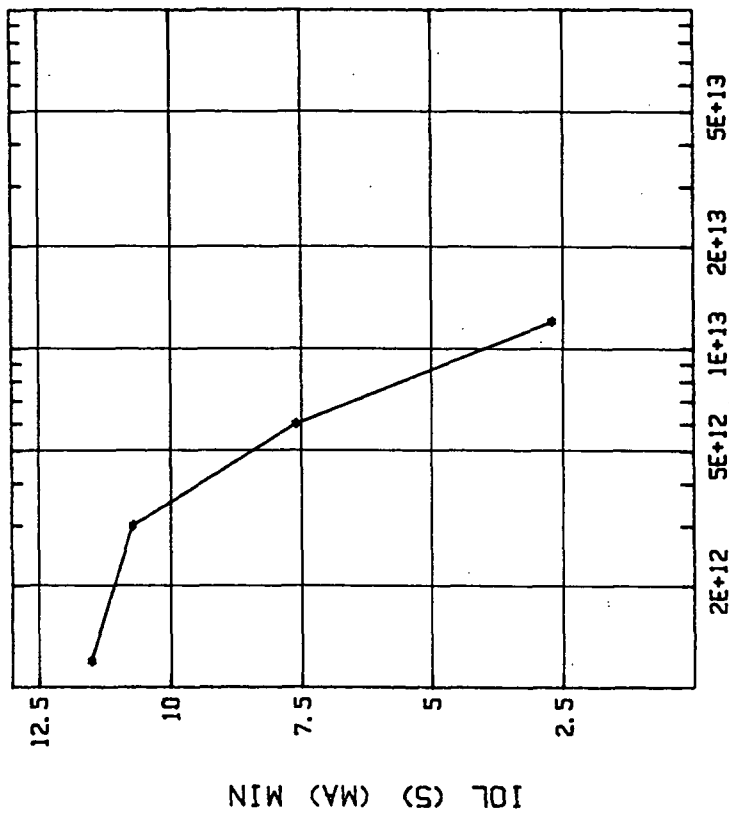
(1) VOL (S) (VOLTS) MIN VS. DOSE
 INITIAL MEAN VALUE VOL (S) (VOLTS) MIN = 4.985

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



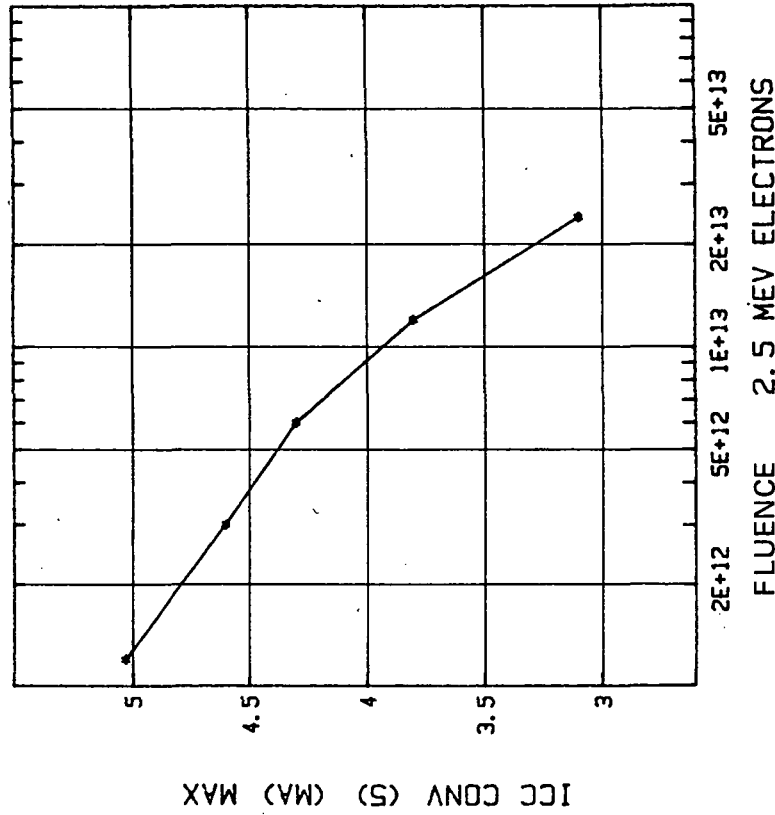
(3) IOH (S) (MA) MIN VS. DOSE
 INITIAL MEAN VALUE IOH (S) (MA) MIN = 369

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



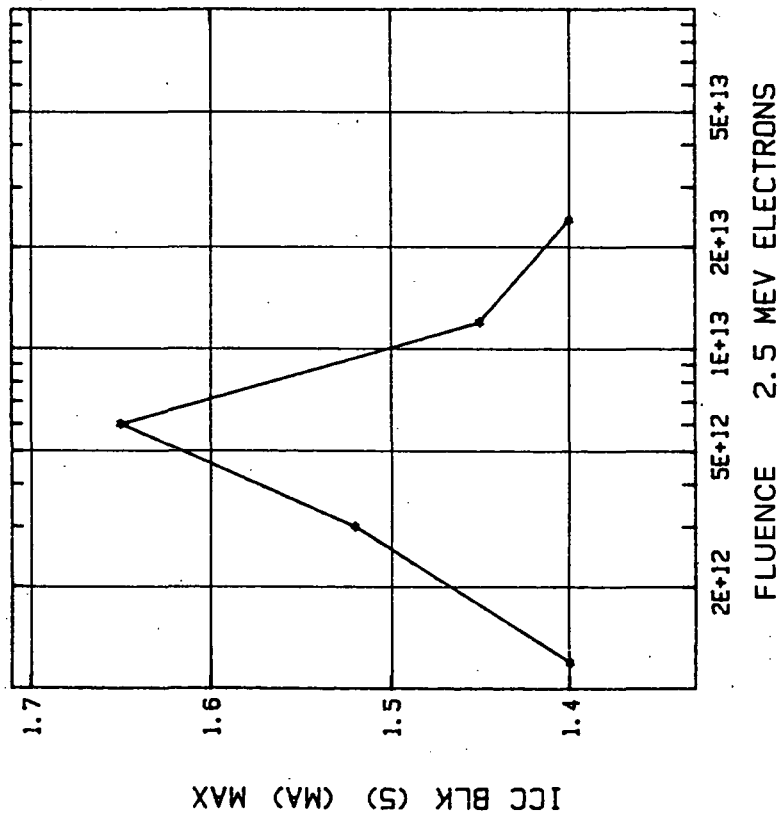
(4) IOL (S) (MA) MIN VS. DOSE
 INITIAL MEAN VALUE IOL (S) (MA) MIN = 12.6

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



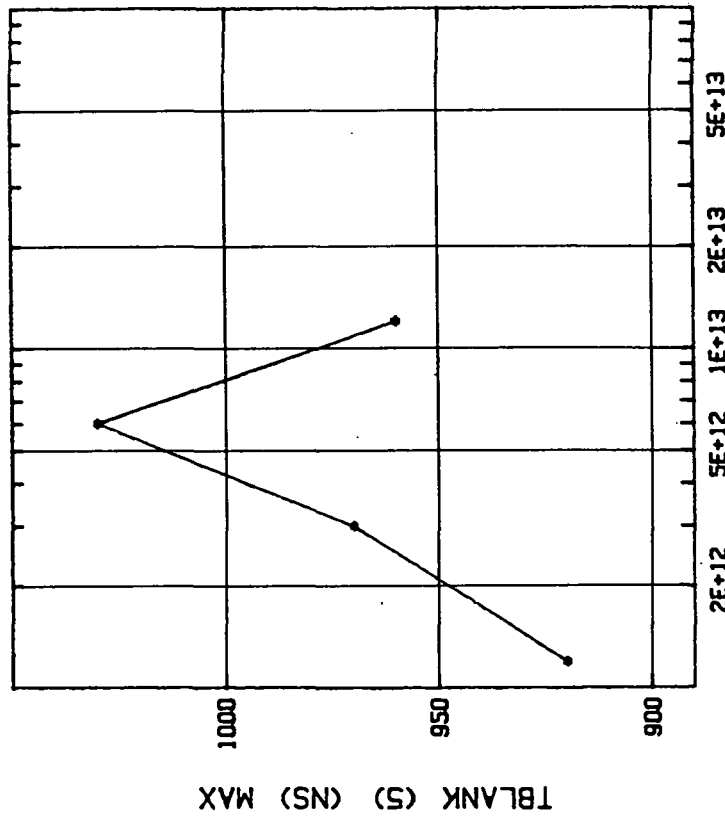
(6) ICC CONV (S) (MA) MAX VS. DOSE
 INITIAL MEAN VALUE ICC CONV (S) (MA) MAX = 5.8

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



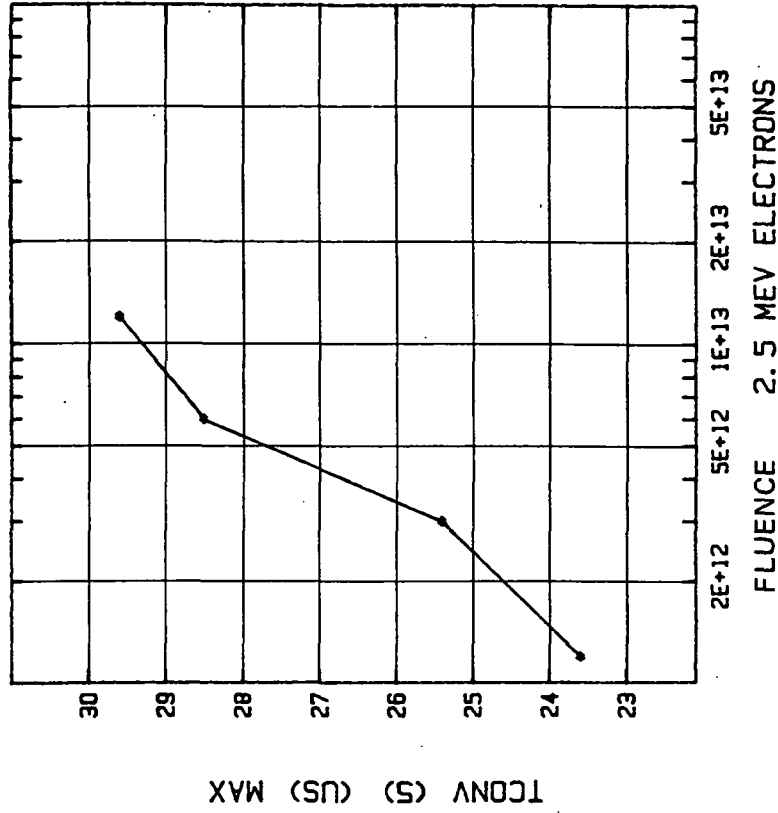
(5) ICC BLK (S) (MA) MAX VS. DOSE
 INITIAL MEAN VALUE ICC BLK (S) (MA) MAX = 1.45

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



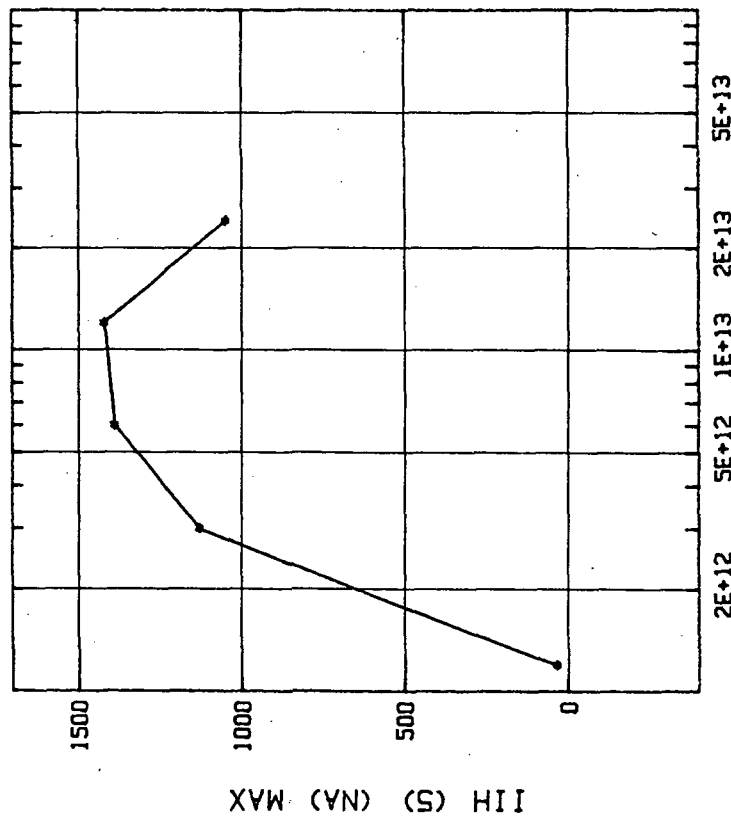
(7) TBLANK (S) (NS) MAX VS. DOSE
 INITIAL MEAN VALUE TBLANK (S) (NS) MAX - 930

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



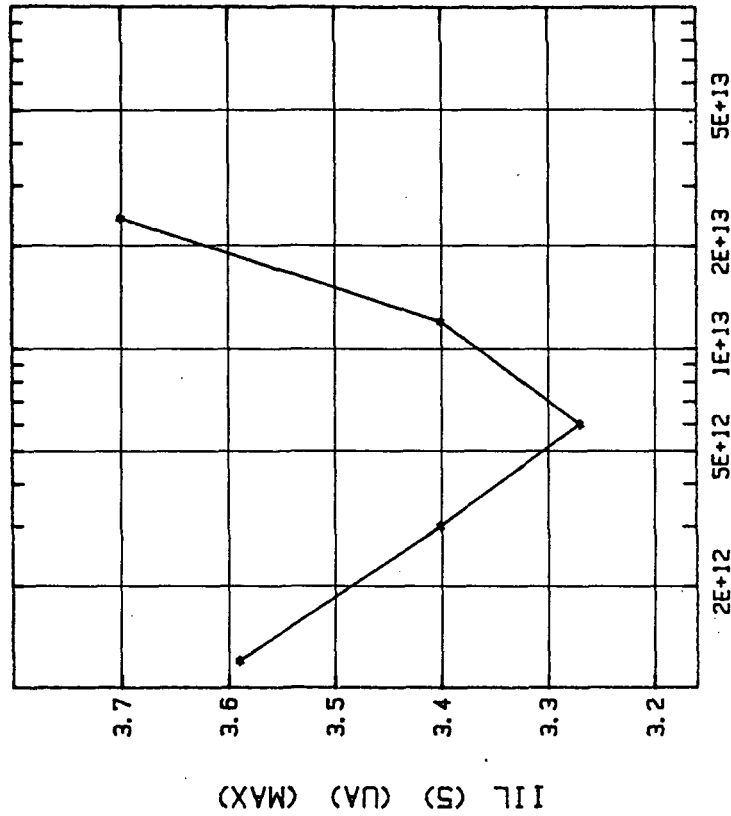
(8) TCONV (S) (US) MAX VS. DOSE
 INITIAL MEAN VALUE TCONV (S) (US) MAX - 20.1

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



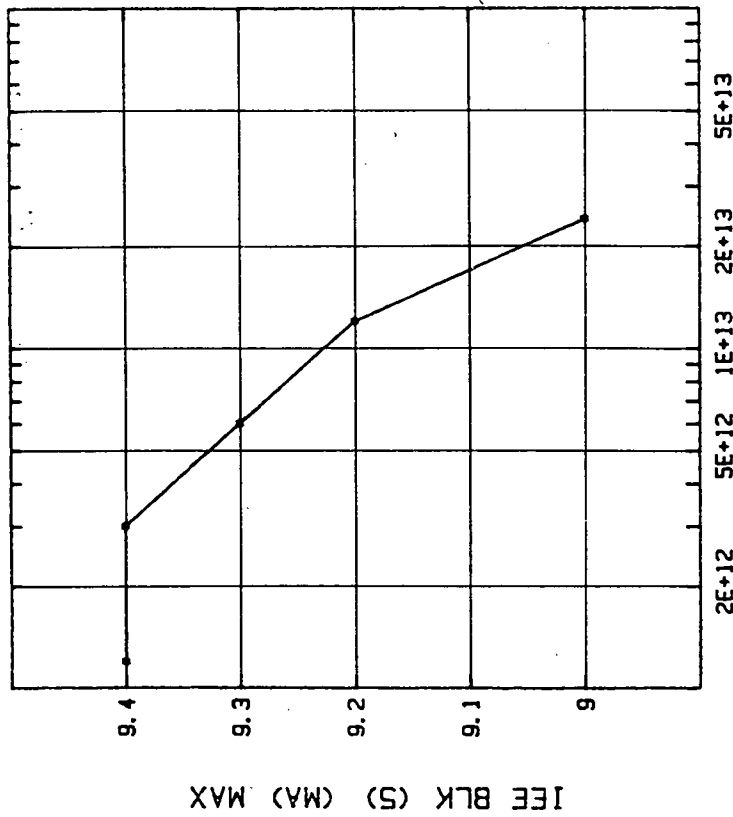
(9) I1H (S) (NA) MAX VS. DOSE
 INITIAL MEAN VALUE I1H (S) (NA) MAX = 17.4

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



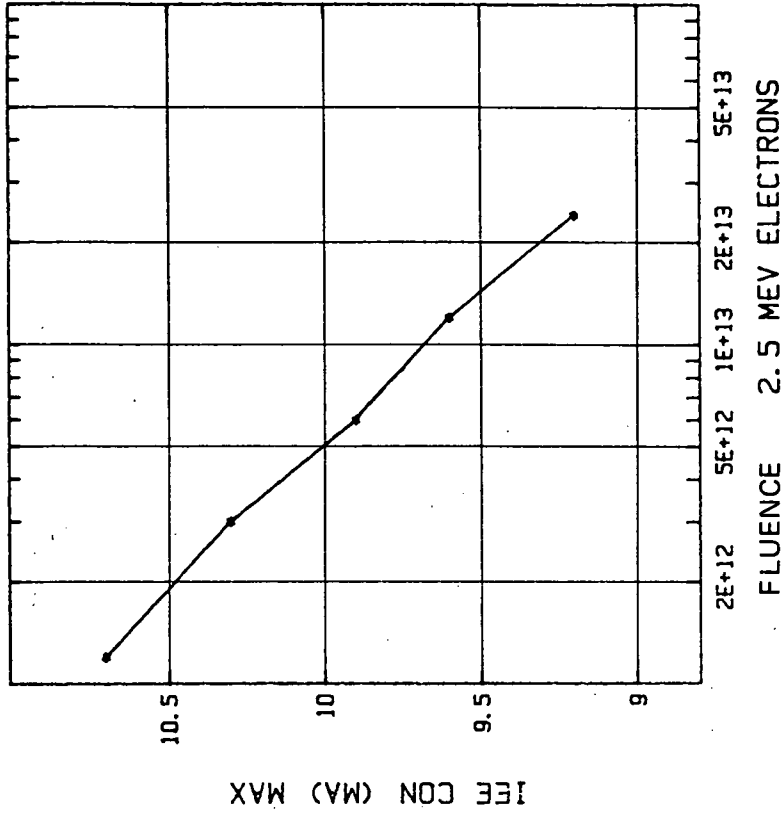
(10) I1L (S) (UA) (MAX) VS. DOSE
 INITIAL MEAN VALUE I1L (S) (UA) (MAX) = 3.01

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



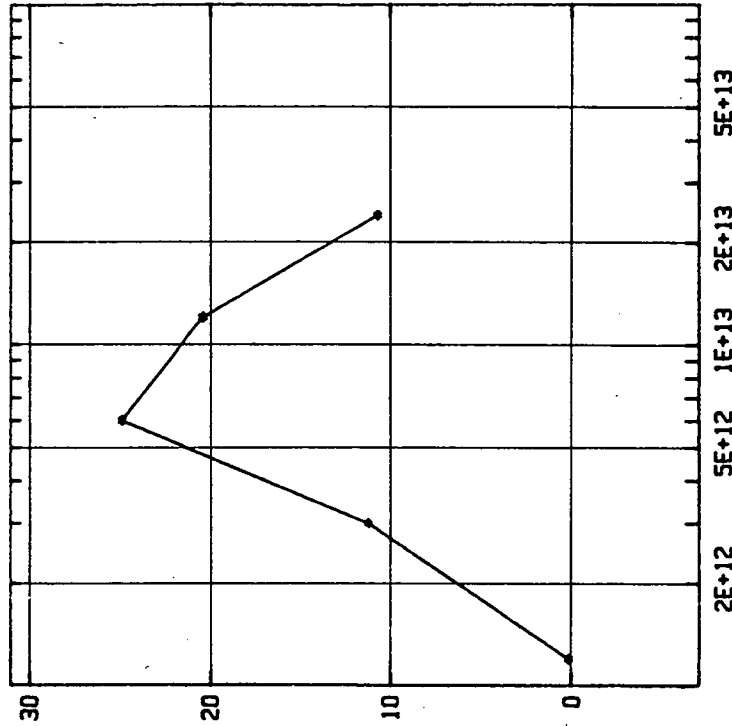
(11) IEE BLK (S) (MA) MAX VS. DOSE
 INITIAL MEAN VALUE IEE BLK (S) (MA) MAX - 9.7

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



(12) IEE CON (MA) MAX VS. DOSE
 INITIAL MEAN VALUE IEE CON (MA) MAX - 11.3

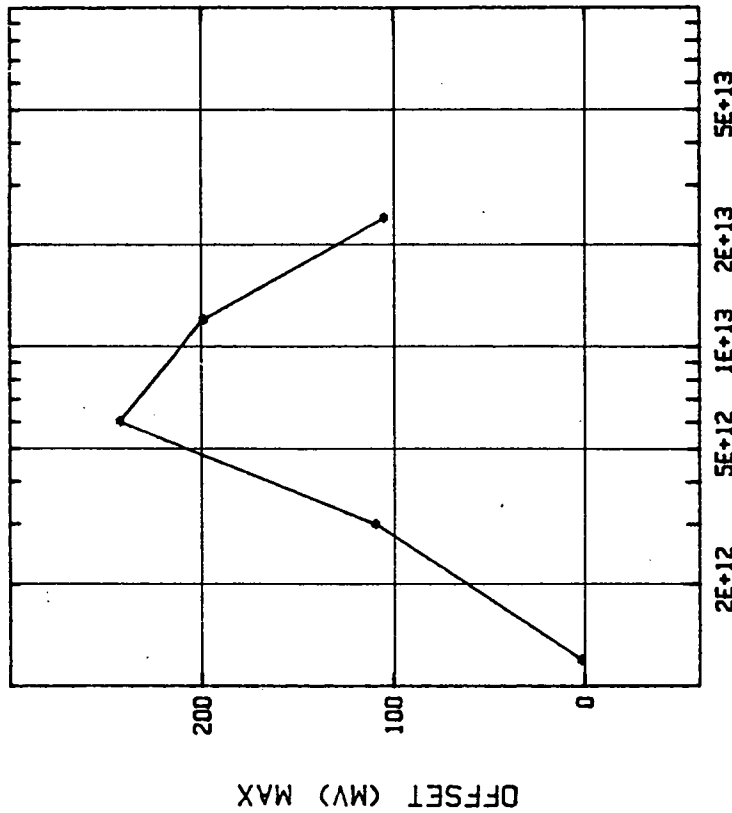
DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



FLUENCE 2.5 MEV ELECTRONS

(14) OFFERR (LSB) MAX VS. DOSE
 INITIAL MEAN VALUE OFFERR (LSB) MAX = .067

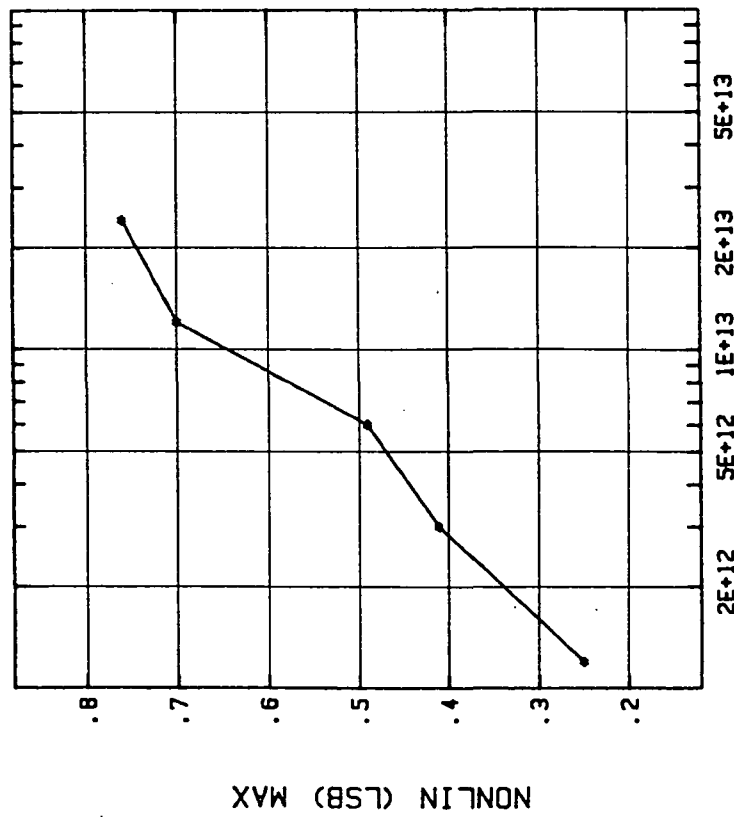
DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



FLUENCE 2.5 MEV ELECTRONS

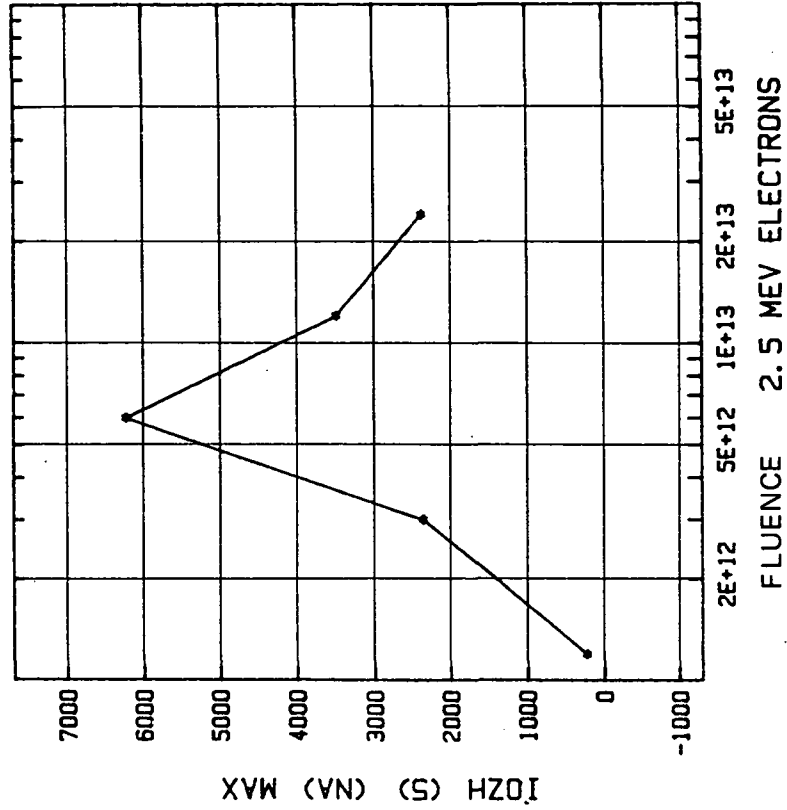
(13) OFFSET (MV) MAX VS. DOSE
 INITIAL MEAN VALUE OFFSET (MV) MAX = 1.6

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



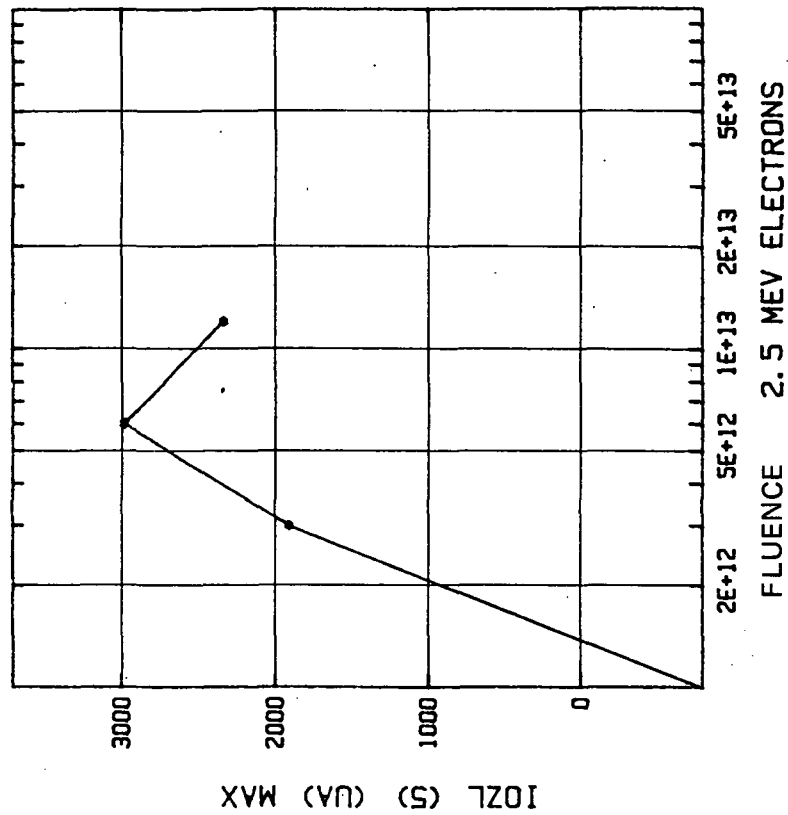
(15) NONLIN (LSB) MAX VS. DOSE
 INITIAL MEAN VALUE NONLIN (LSB) MAX = .18

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



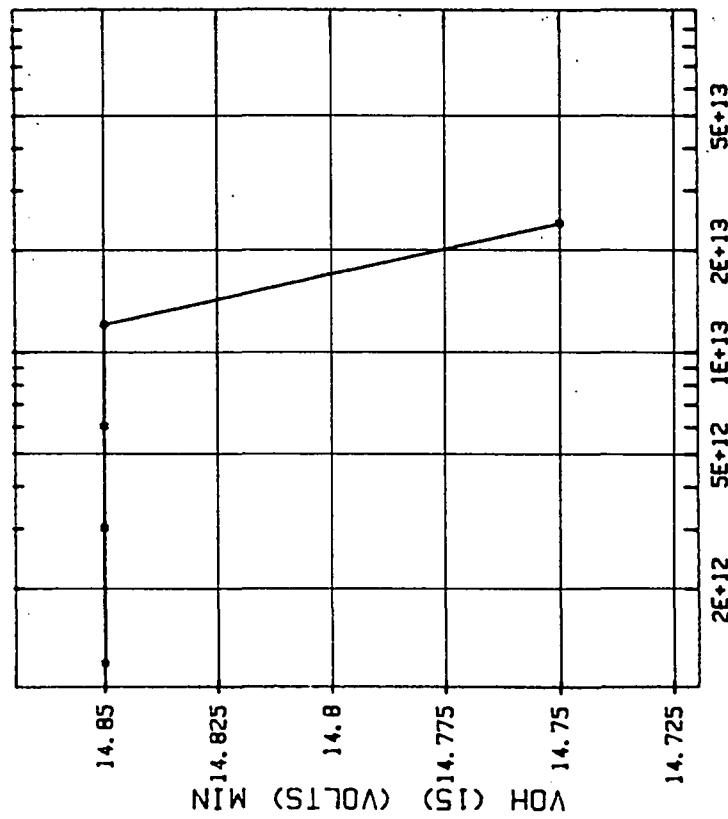
(16) IOZH (S) (NA) MAX VS. DOSE
 INITIAL MEAN VALUE IOZH (S) (NA) MAX = .51

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-1 DATE CODE: -



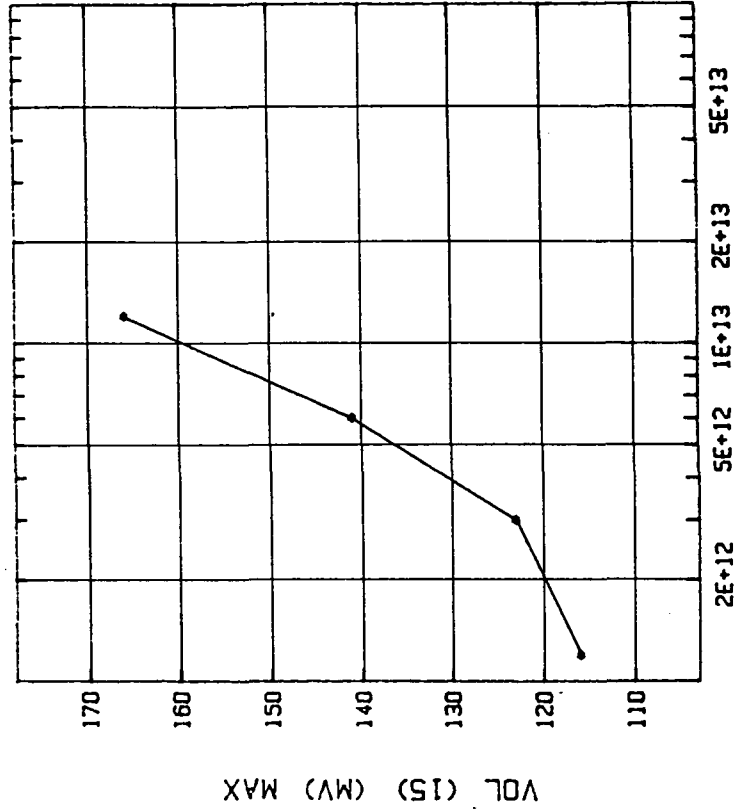
(17) IOZL (S) (UA) MAX VS. DOSE
 INITIAL MEAN VALUE IOZL (S) (UA) MAX = .053

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



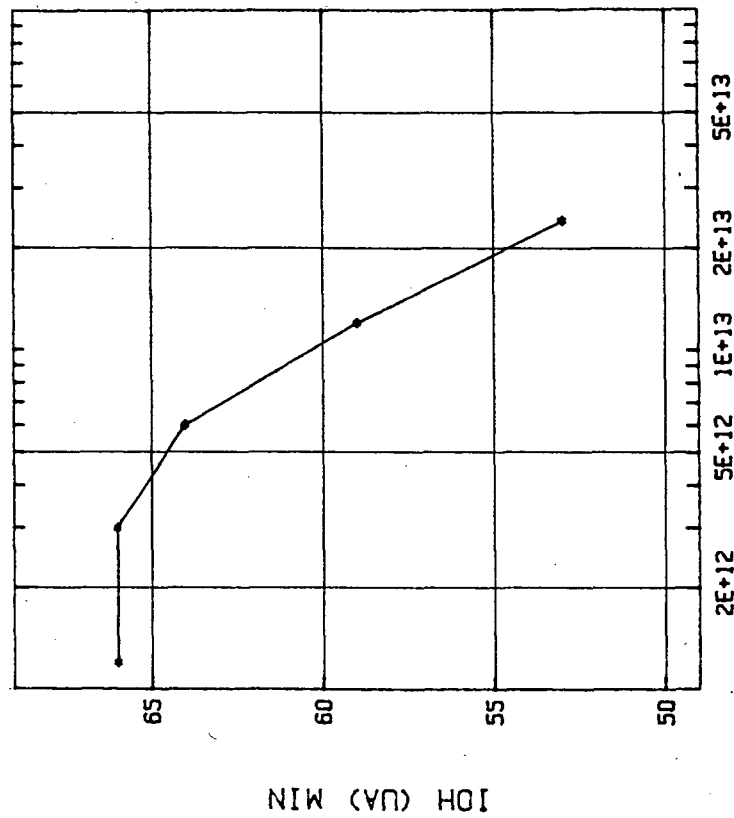
(1) VDH (15) (VOLTS) MIN VS. DOSE
 INITIAL MEAN VALUE VDH (15) (VOLTS) MIN - 14.85

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



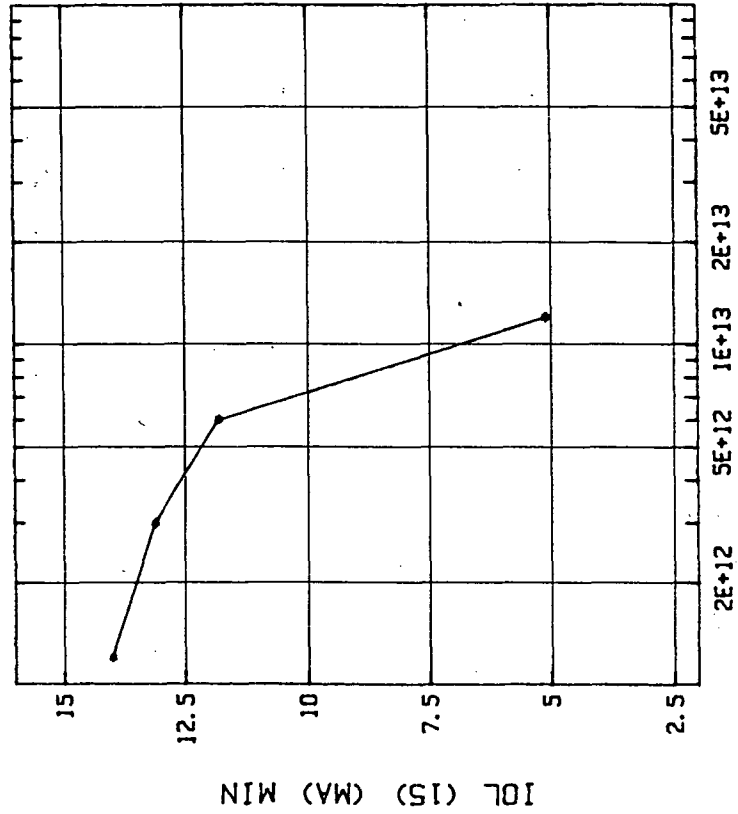
(2) VOL (15) (MV) MAX VS. DOSE
 INITIAL MEAN VALUE VOL (15) (MV) MAX - 107

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADJ 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



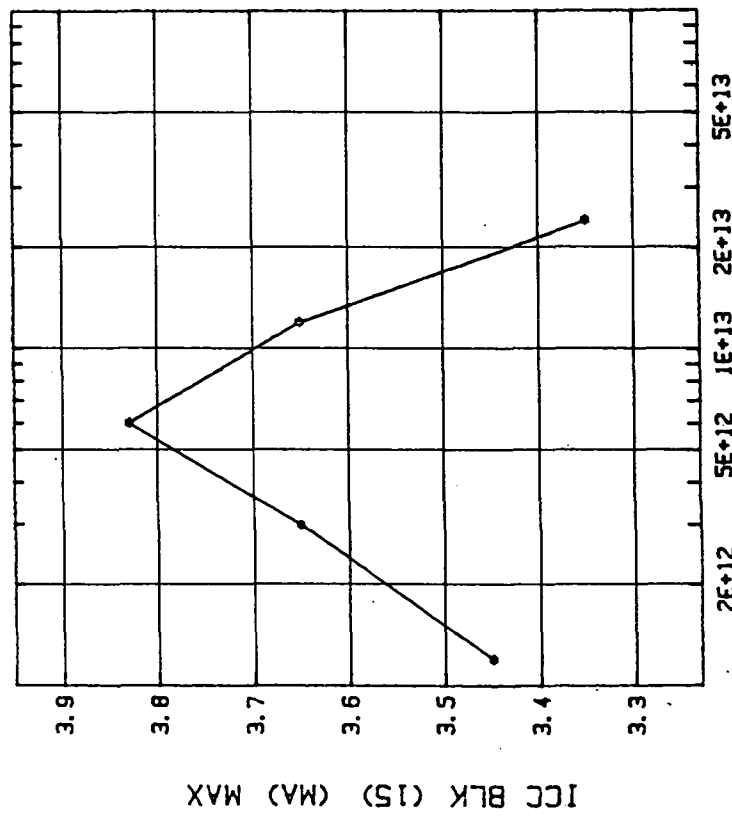
(3) IOH (UA) MIN VS. DOSE
 INITIAL MEAN VALUE IOH (UA) MIN = 67

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADJ 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



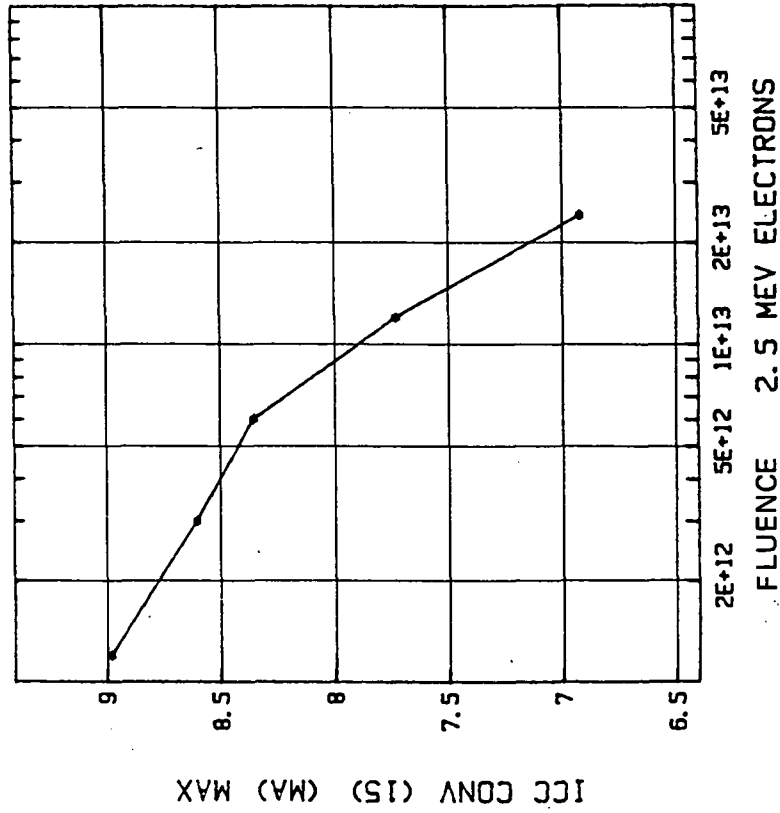
(4) IOL (IS) (MA) MIN VS. DOSE
 INITIAL MEAN VALUE IOL (IS) (MA) MIN = 15.3

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



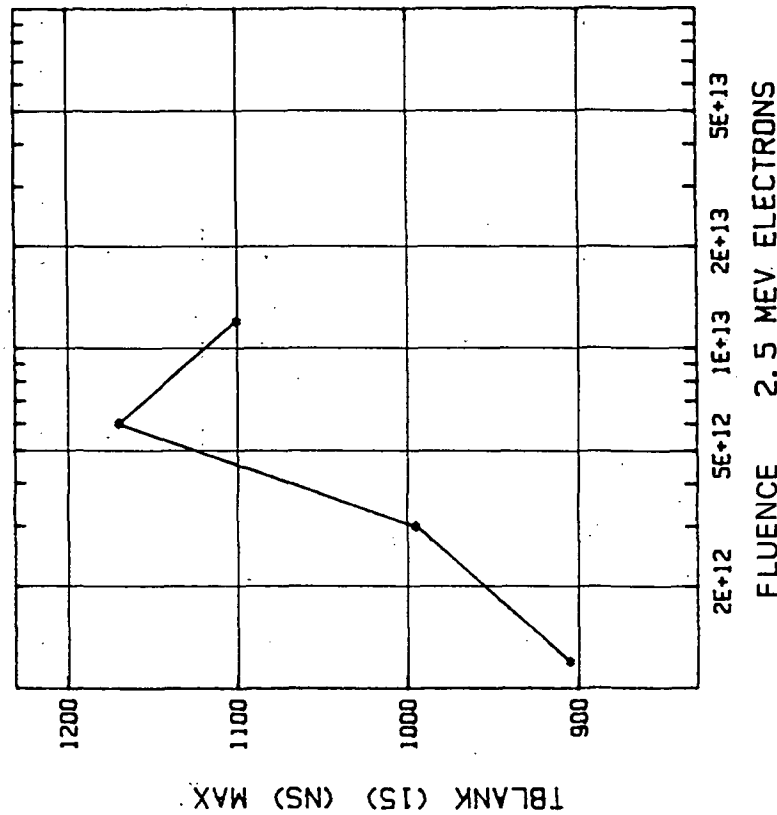
(5) ICC BLK (15) QMA) MAX VS. DOSE
 INITIAL MEAN VALUE ICC BLK (15) QMA) MAX = 3.5

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



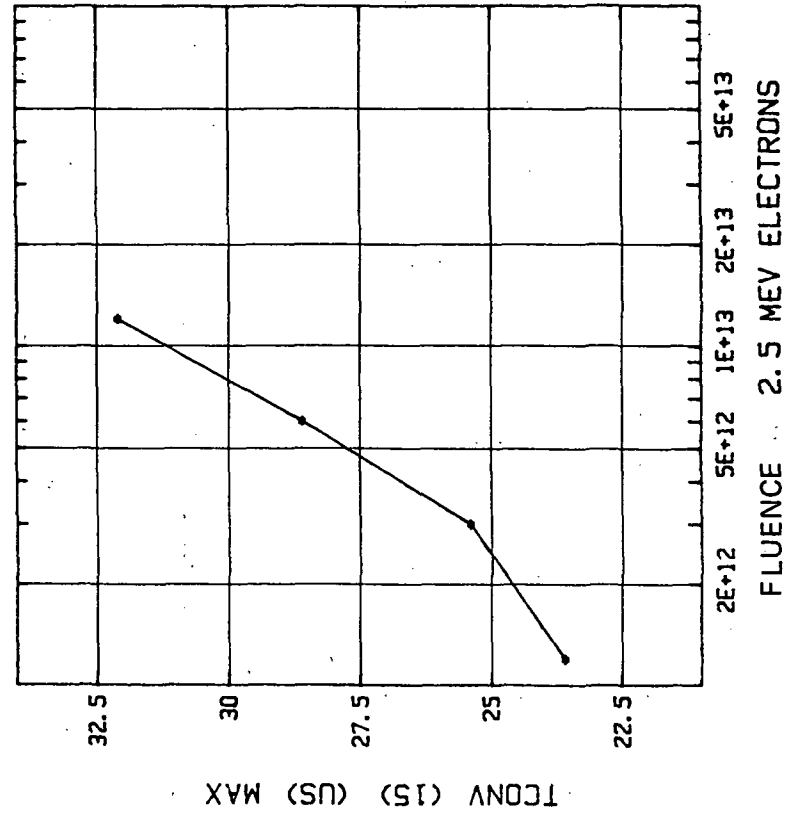
(6) ICC CONV (15) QMA) MAX VS. DOSE
 INITIAL MEAN VALUE ICC CONV (15) QMA) MAX = 9.95

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



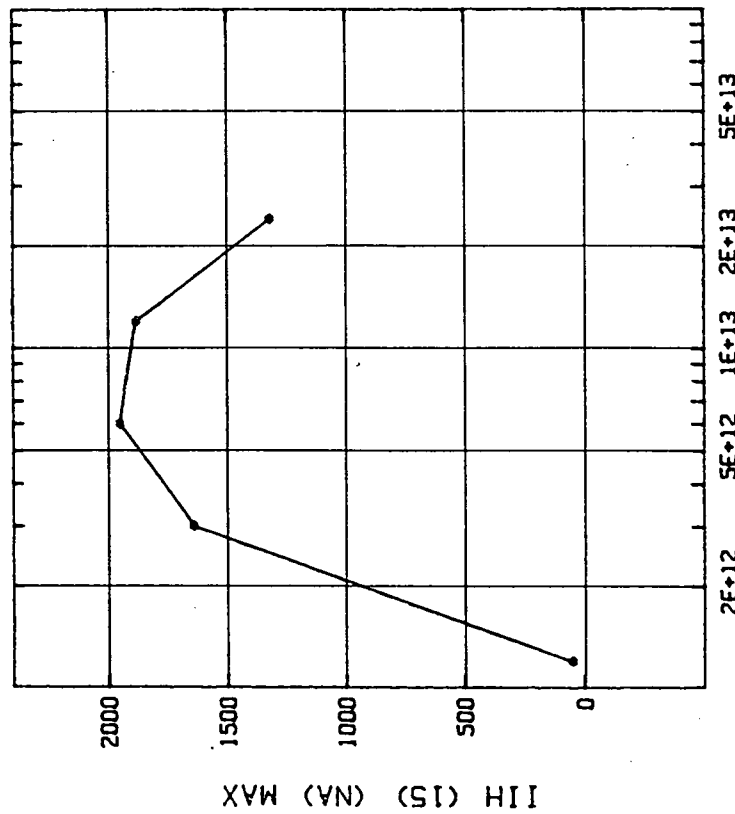
(7) TBLANK (1S) (NS) MAX VS. DOSE
 INITIAL MEAN VALUE TBLANK (1S) (NS) MAX - 880

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



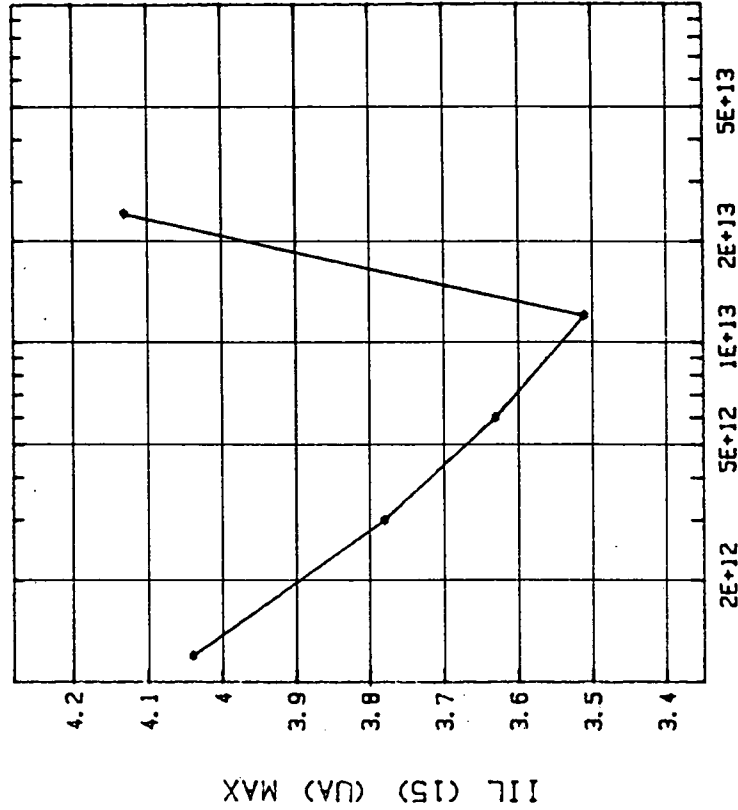
(8) TCONV (1S) (US) MAX VS. DOSE
 INITIAL MEAN VALUE TCONV (1S) (US) MAX - 22

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



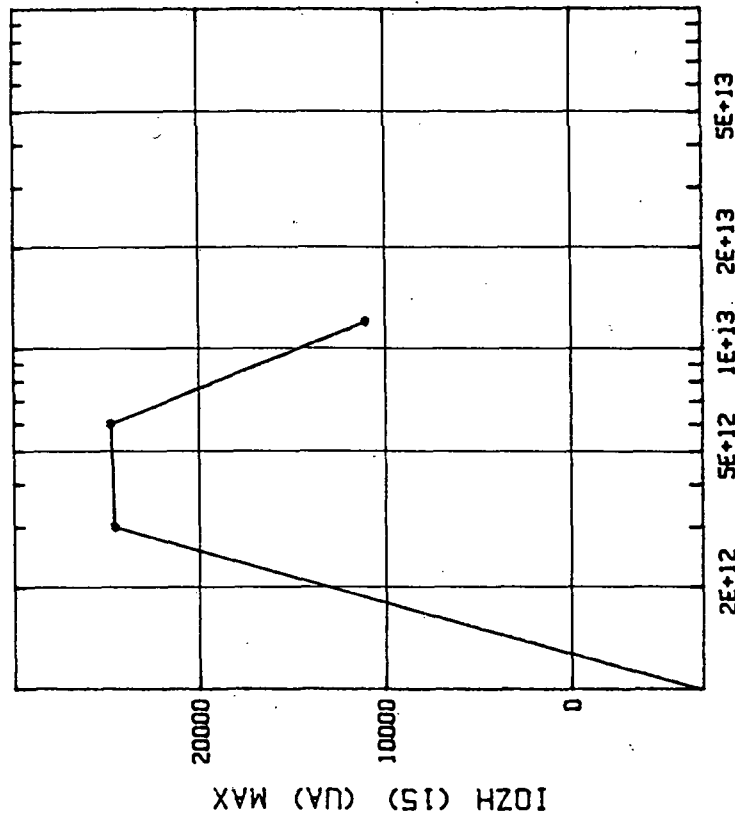
(9) I1H (15) (NA) MAX VS. DOSE
 INITIAL MEAN VALUE I1H (15) (NA) MAX = 18.4

DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



(10) I1L (15) (UA) MAX VS. DOSE
 INITIAL MEAN VALUE I1L (15) (UA) MAX = 3.48

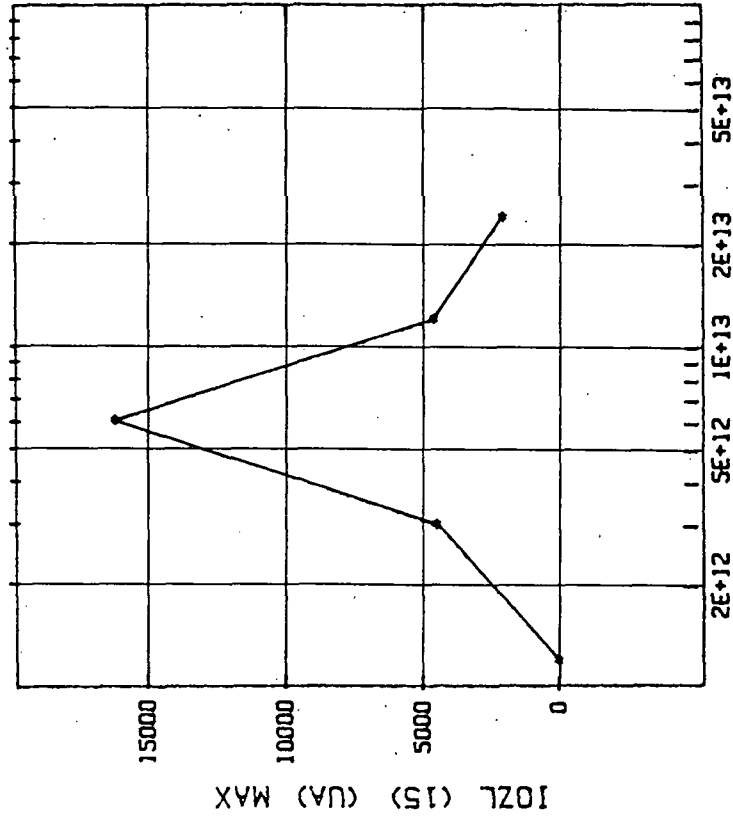
DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



FLUENCE 2.5 MEV ELECTRONS

(11) IOZH (15) QUA) MAX VS. DOSE
 INITIAL MEAN VALUE IOZH (15) QUA) MAX - 5.8

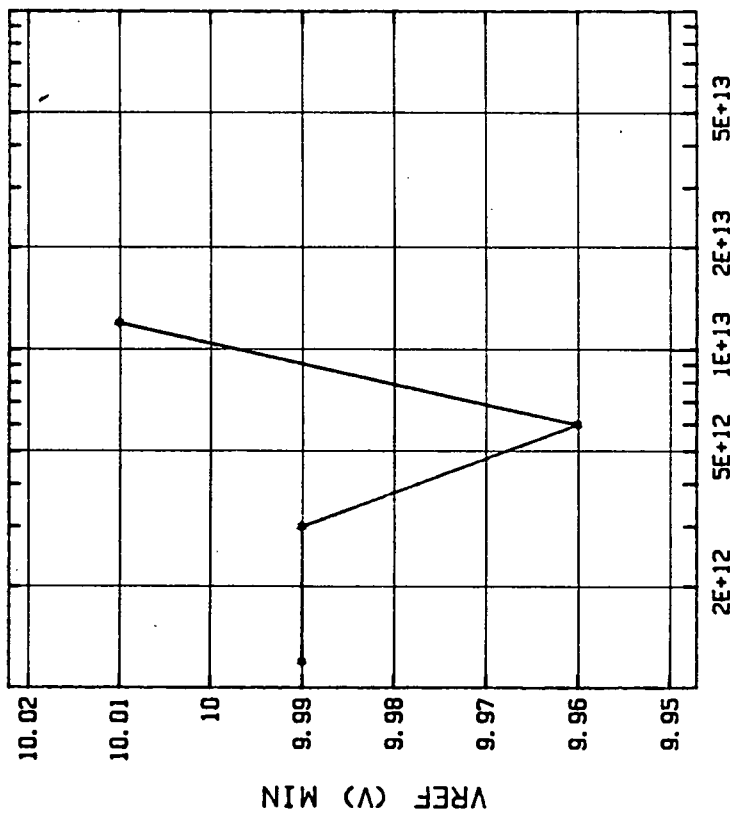
DEVICE TYPE: AD571 10-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 5-26-81
 REF: JPL LOG 0733-2 DATE CODE: -



FLUENCE 2.5 MEV ELECTRONS

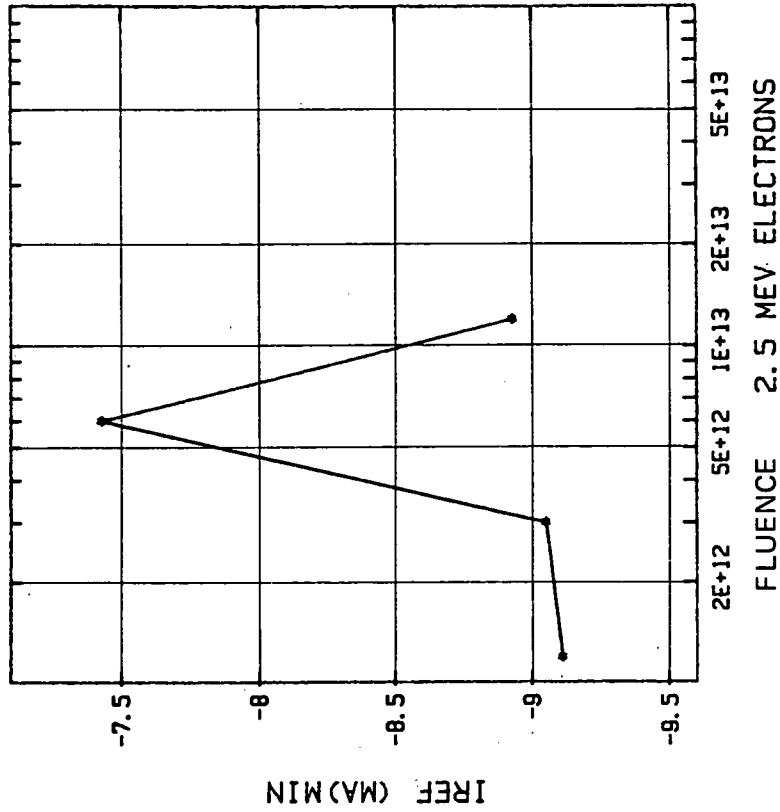
(12) IOZL (15) QUA) MAX VS. DOSE
 INITIAL MEAN VALUE IOZL (15) QUA) MAX - 10.8

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: --



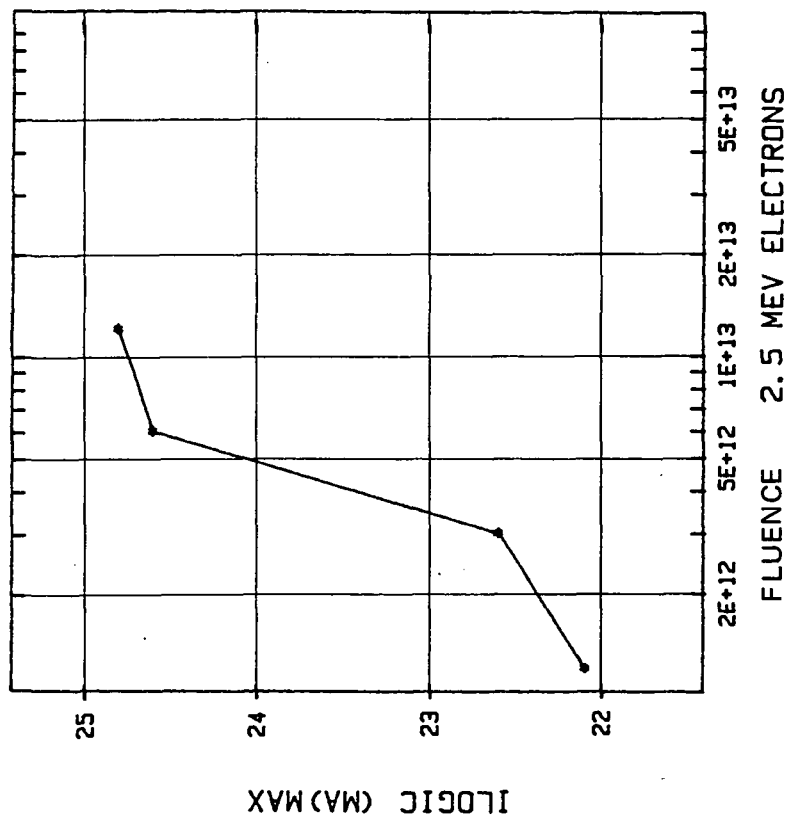
(1) VREF (V) MIN VS. DOSE
 INITIAL MEAN VALUE VREF (V) MIN = 9.99

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: --



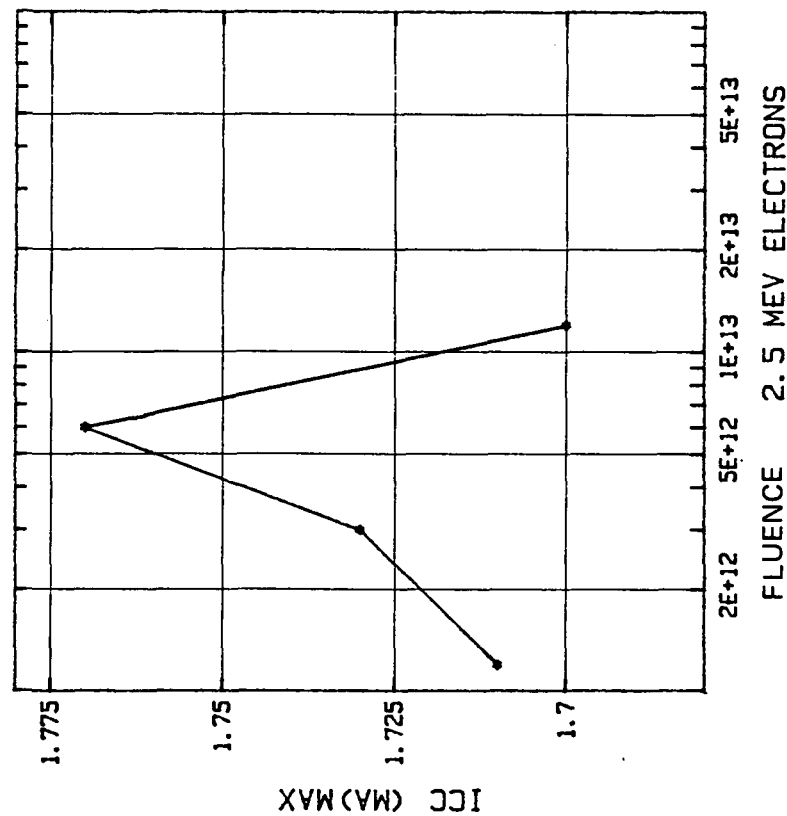
(2) IREF (MA) MIN VS. DOSE
 INITIAL MEAN VALUE IREF (MA) MIN = -9.5

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



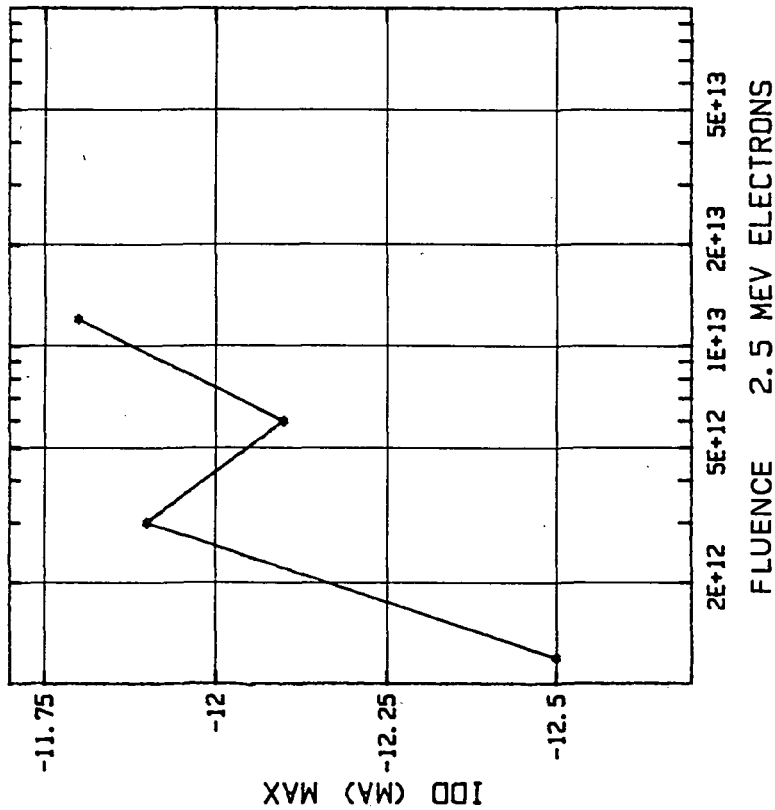
(3) ILOGIC (MA) MAX VS. DOSE
 INITIAL MEAN VALUE ILOGIC (MA) MAX = 22.6

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



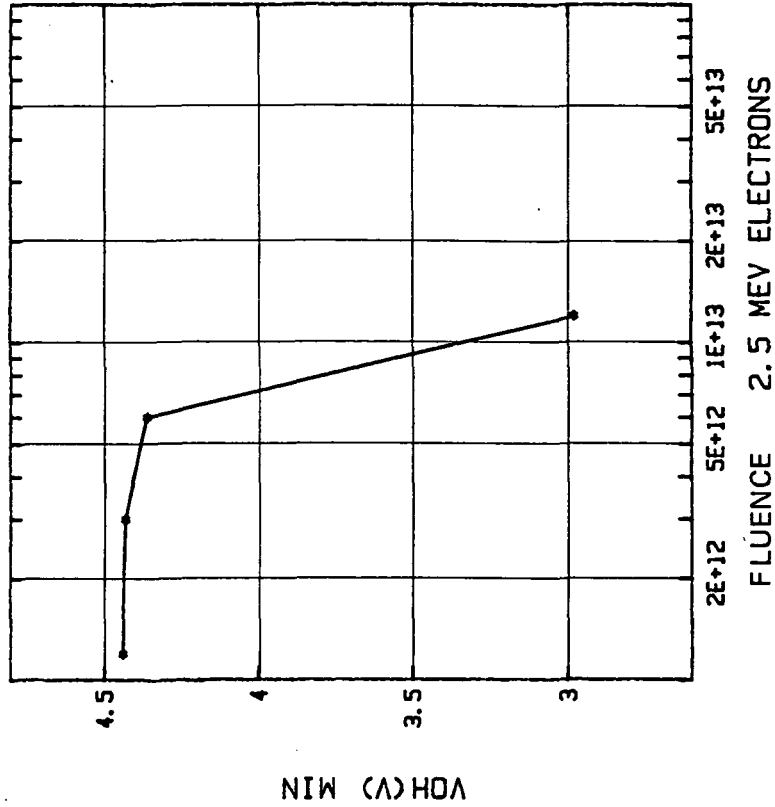
(4) ICC (MA) MAX VS. DOSE
 INITIAL MEAN VALUE ICC (MA) MAX = 1.71

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



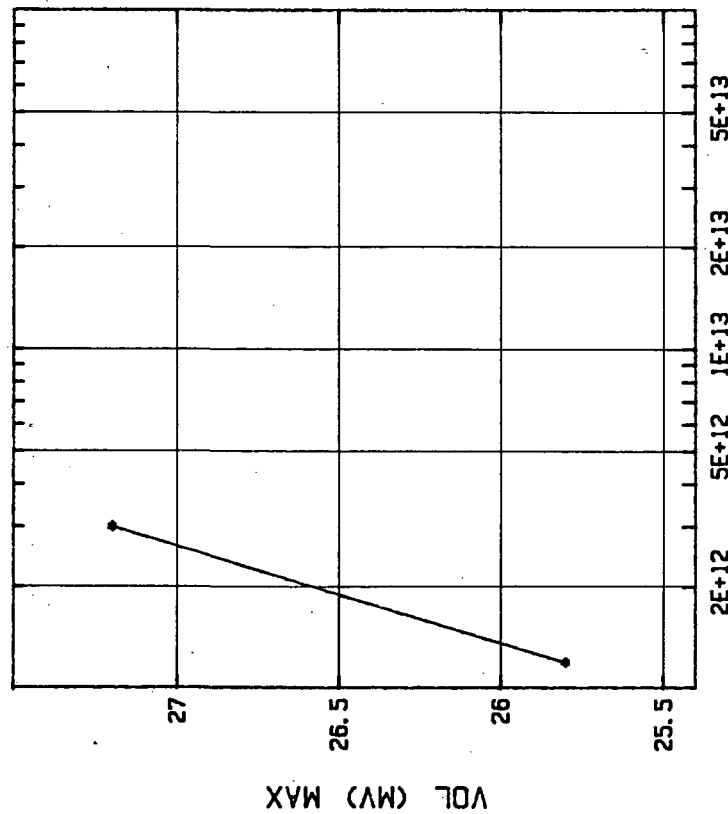
(5) IDD (mA) MAX VS. DOSE
 INITIAL MEAN VALUE IDD (mA) MAX = -13.4

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



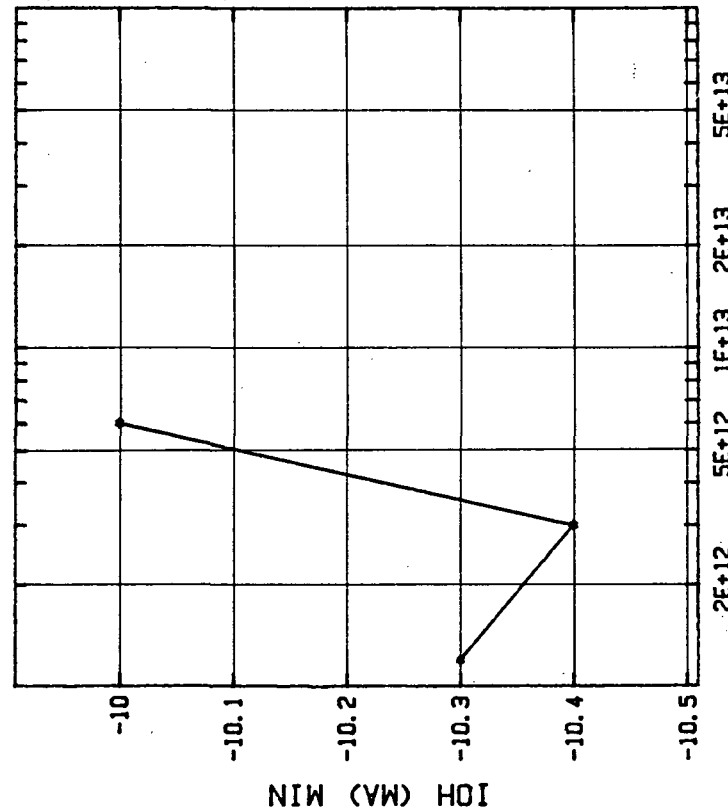
(6) VDD (V) MIN VS. DOSE
 INITIAL MEAN VALUE VDD (V) MIN = 4.44

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



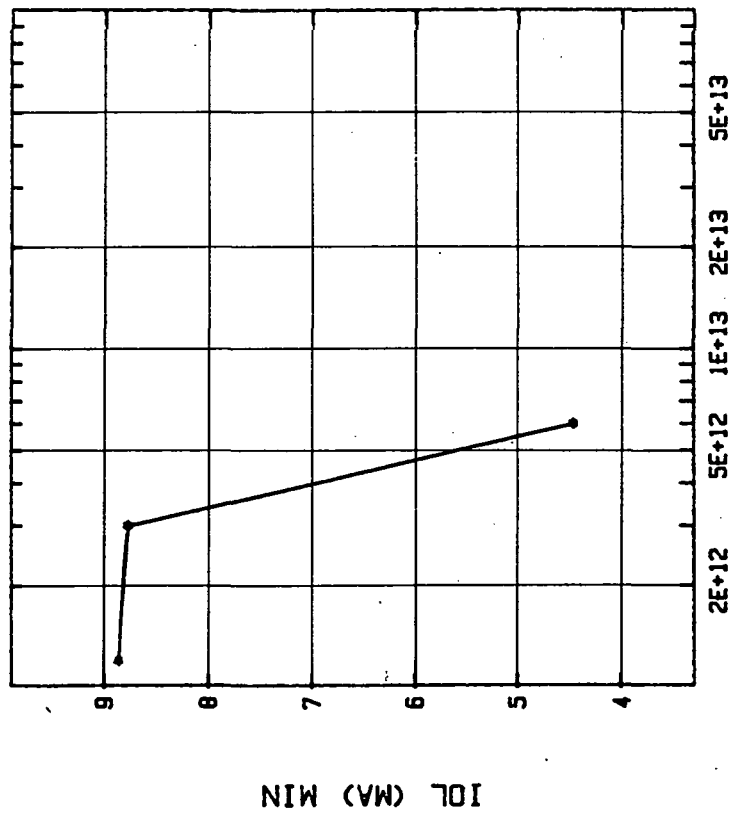
(7) VOL (MV) MAX VS. DOSE
 INITIAL MEAN VALUE VOL (MV) MAX = 24.7

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



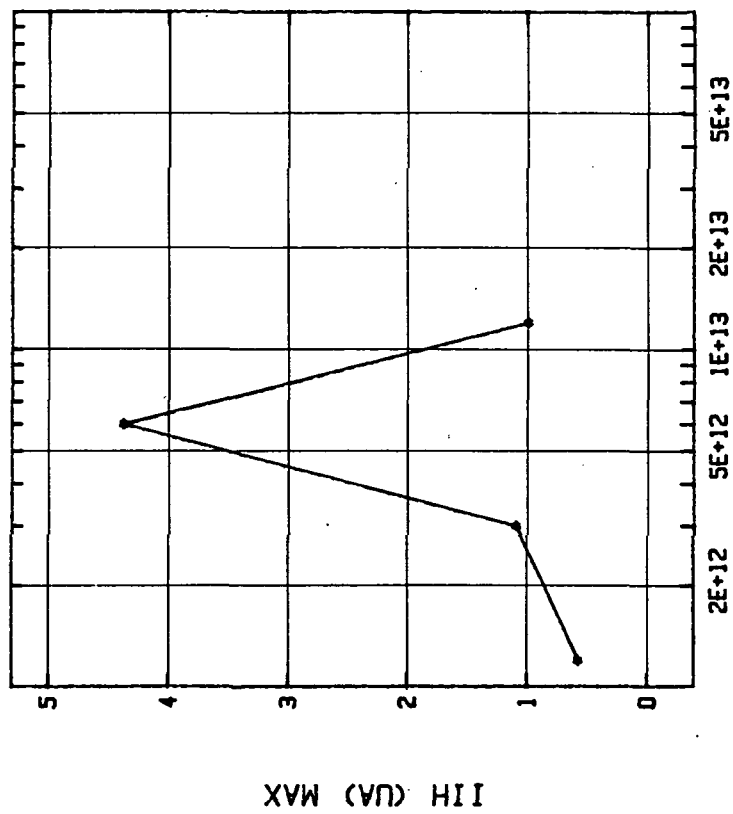
(8) IOH (MA) MIN VS. DOSE
 INITIAL MEAN VALUE IOH (MA) MIN = -10.8

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



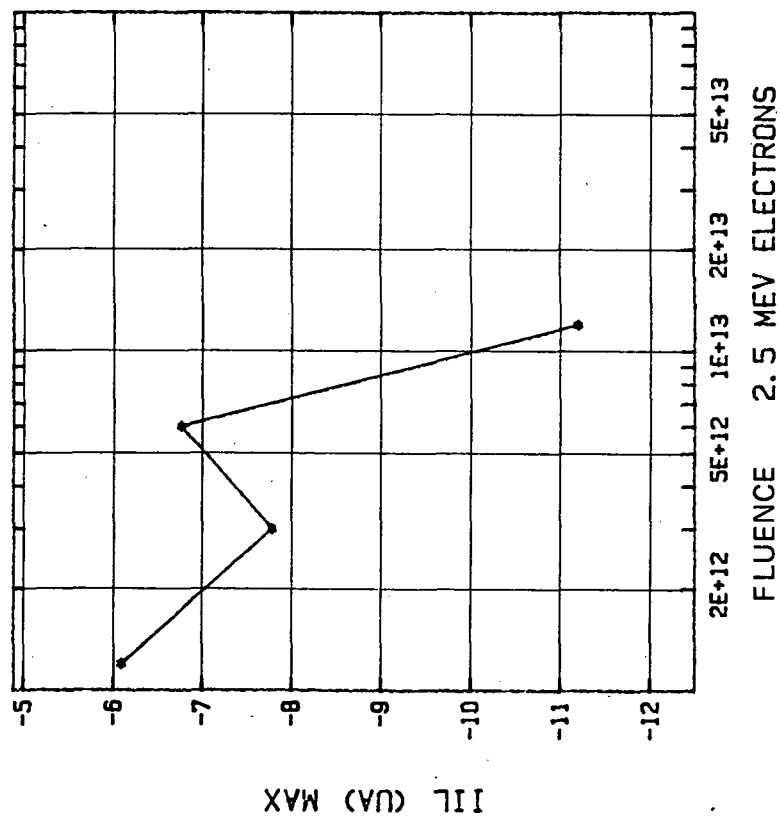
(9) IOL (MA) MIN VS. DOSE
 INITIAL MEAN VALUE IOL (MA) MIN = 8.05

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



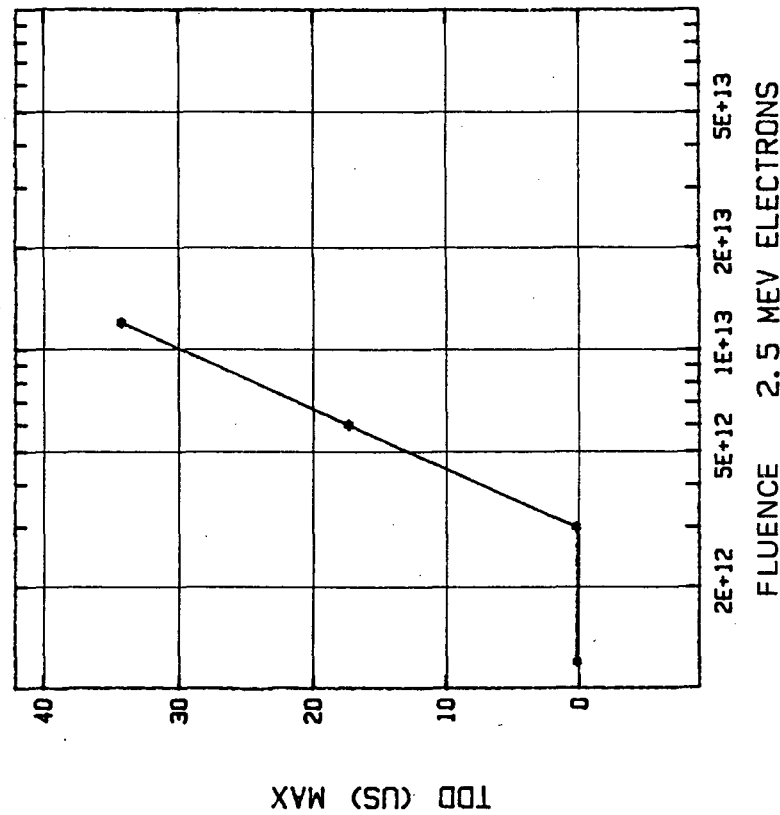
(10) IIH (QA) MAX VS. DOSE
 INITIAL MEAN VALUE IIH (QA) MAX = .392

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



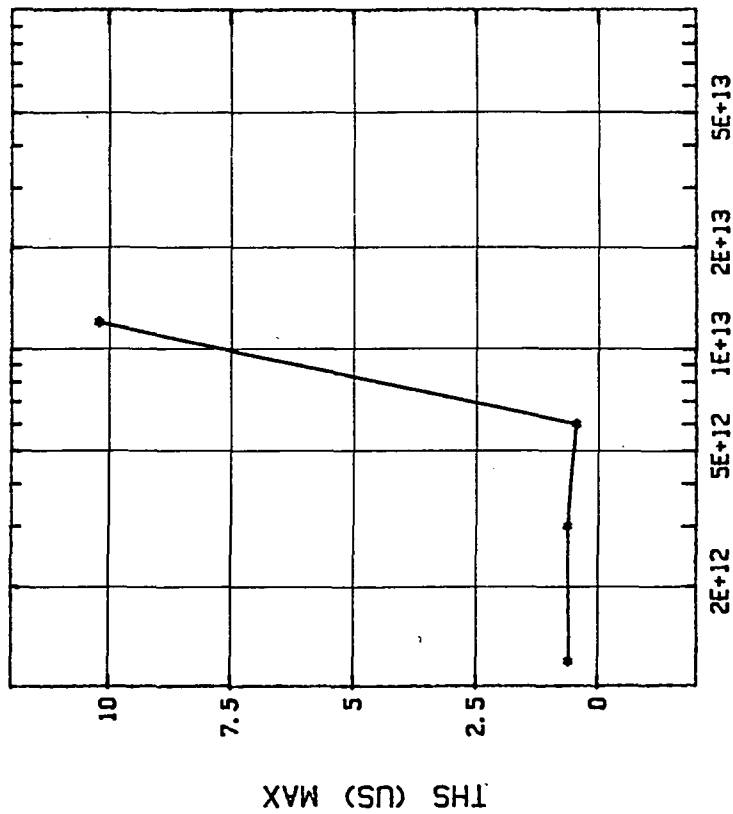
(11) IIL (UA) MAX VS. DOSE
 INITIAL MEAN VALUE IIL (UA) MAX = -3.29

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



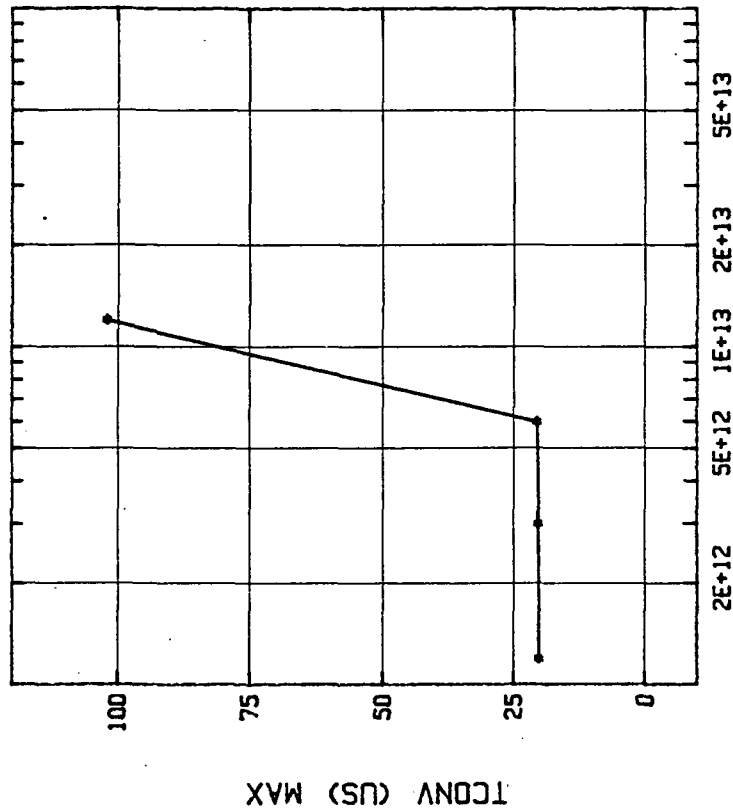
(12) TOD (US) MAX VS. DOSE
 INITIAL MEAN VALUE TOD (US) MAX = .159

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



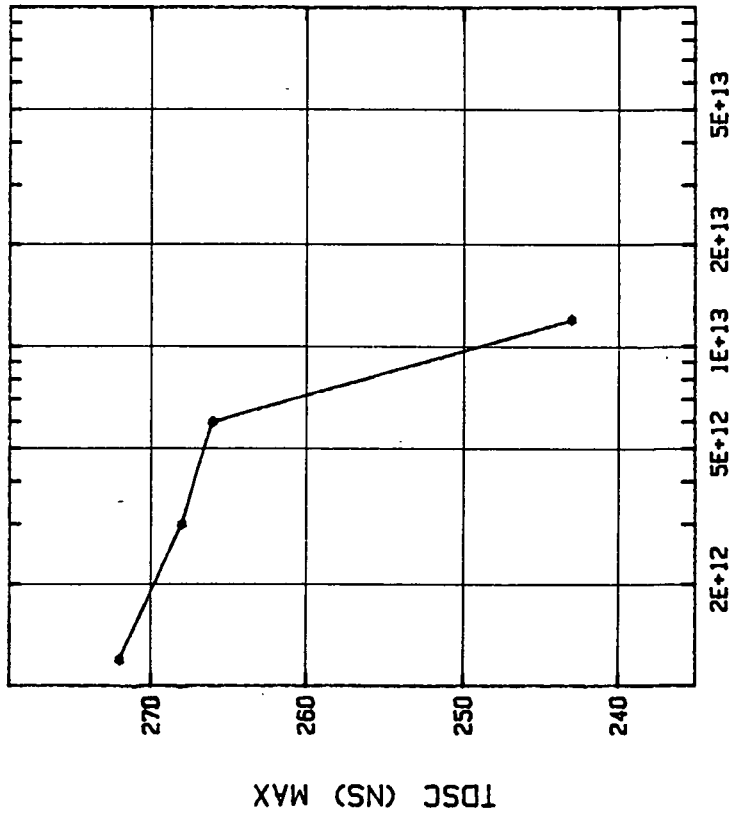
(13) THS (US) MAX VS. DOSE
 INITIAL MEAN VALUE THS (US) MAX - .602

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



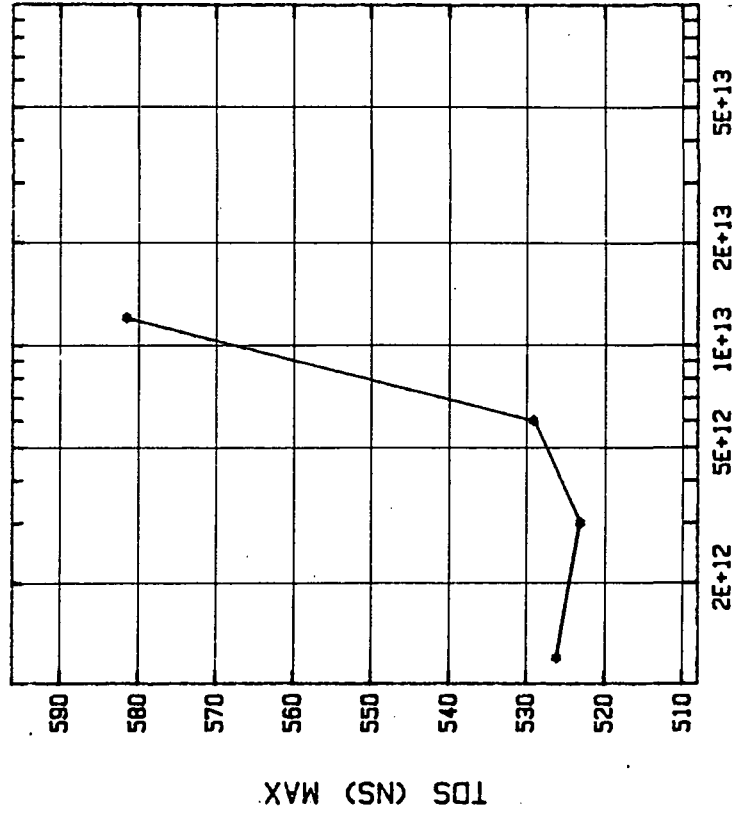
(14) TCONV (US) MAX VS. DOSE
 INITIAL MEAN VALUE TCONV (US) MAX - 20.3

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



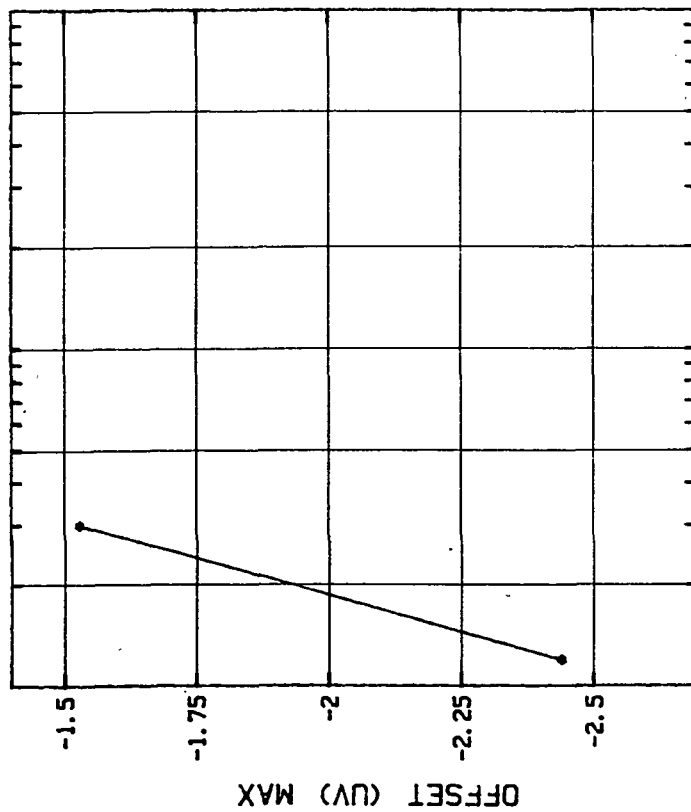
(15) TDSC (NS) MAX VS. DOSE
 INITIAL MEAN VALUE TDSC (NS) MAX = 274

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



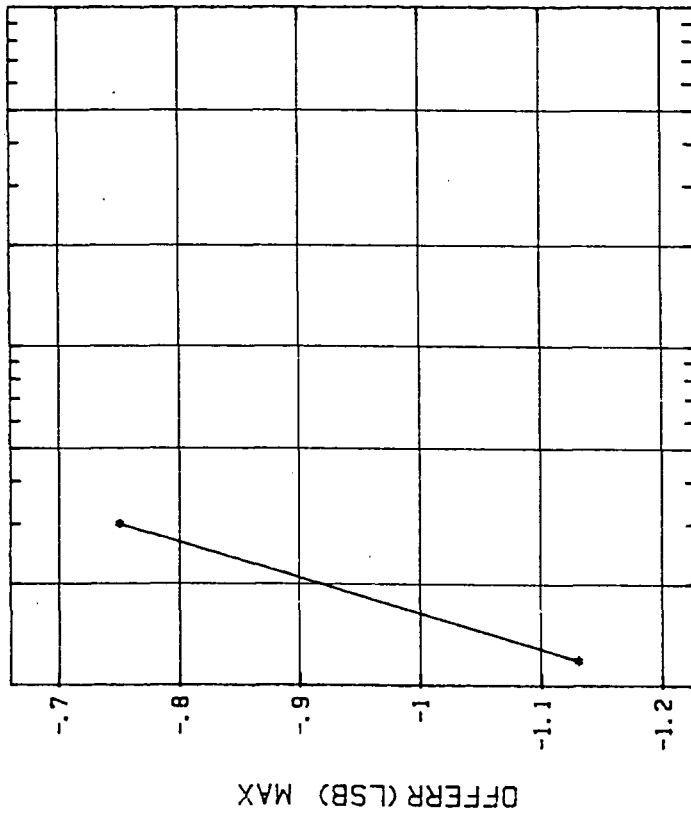
(16) TDS (NS) MAX VS. DOSE
 INITIAL MEAN VALUE TDS (NS) MAX = 514

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



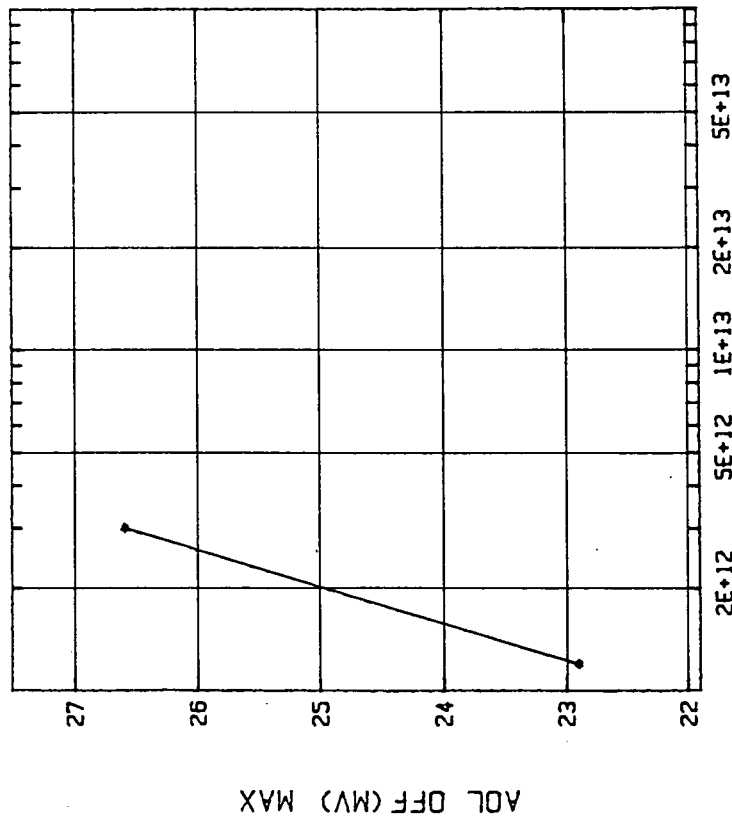
(17) OFFSET (QV) MAX VS. DOSE
 INITIAL MEAN VALUE OFFSET (QV) MAX = -3.36

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



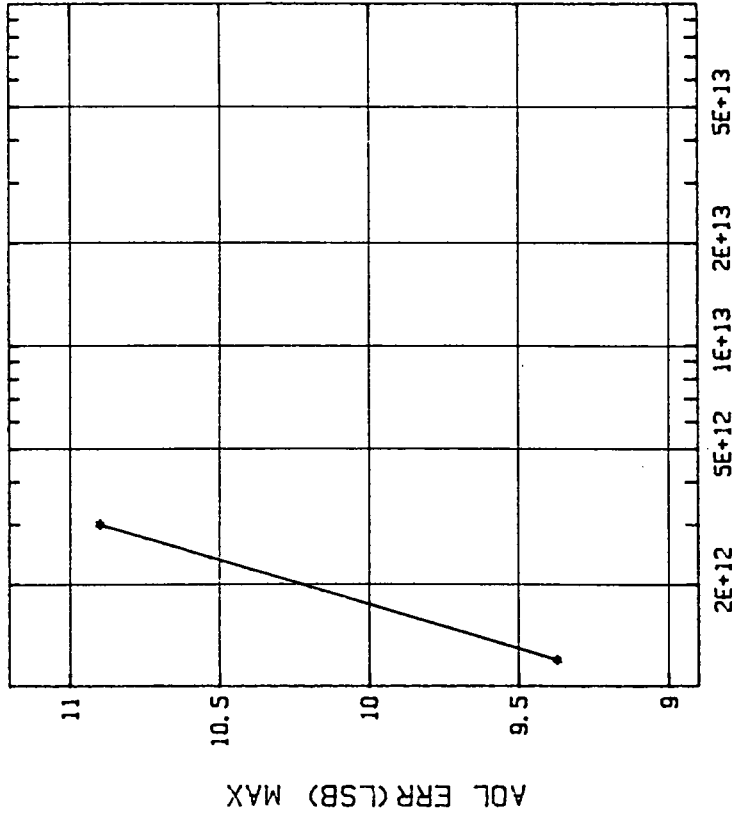
(18) OFFERR (LSB) MAX VS. DOSE
 INITIAL MEAN VALUE OFFERR (LSB) MAX = -1.5

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



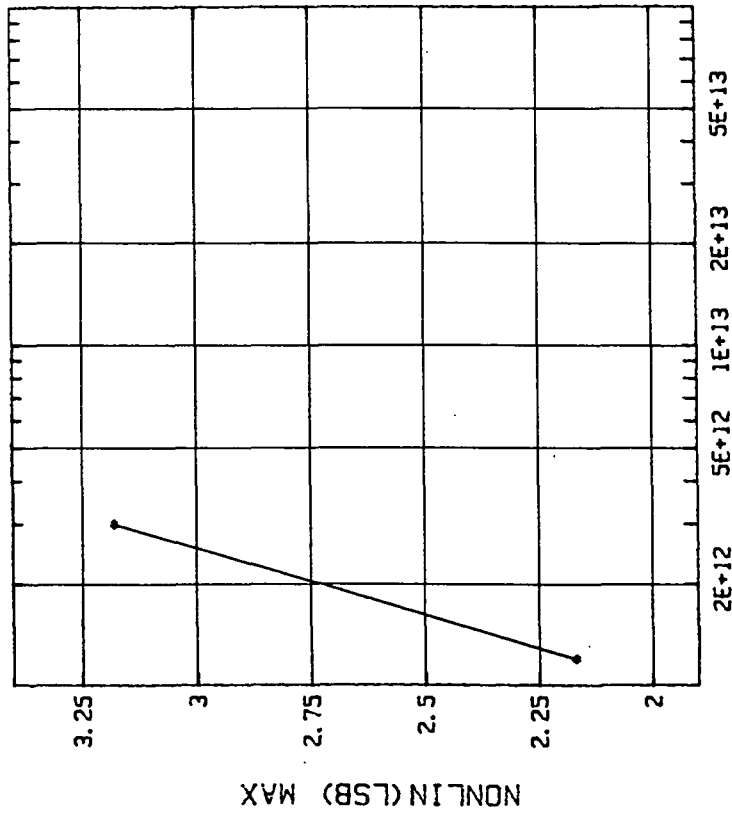
(19) AOL OFF (MV) MAX VS. DOSE
 INITIAL MEAN VALUE AOL OFF (MV) MAX = 25.6

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



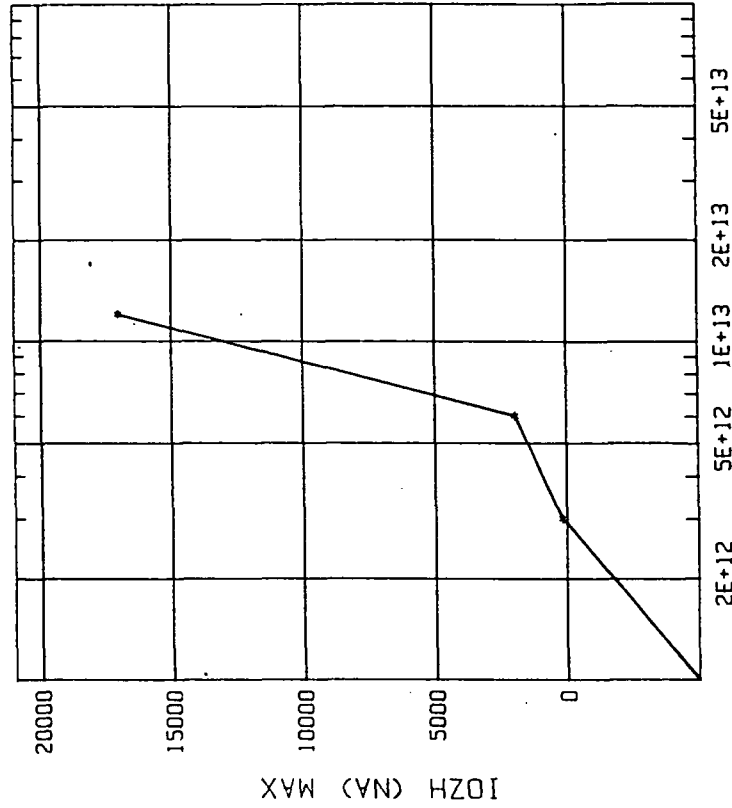
(20) AOL ERR (LSB) MAX VS. DOSE
 INITIAL MEAN VALUE AOL ERR (LSB) MAX = 10.5

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



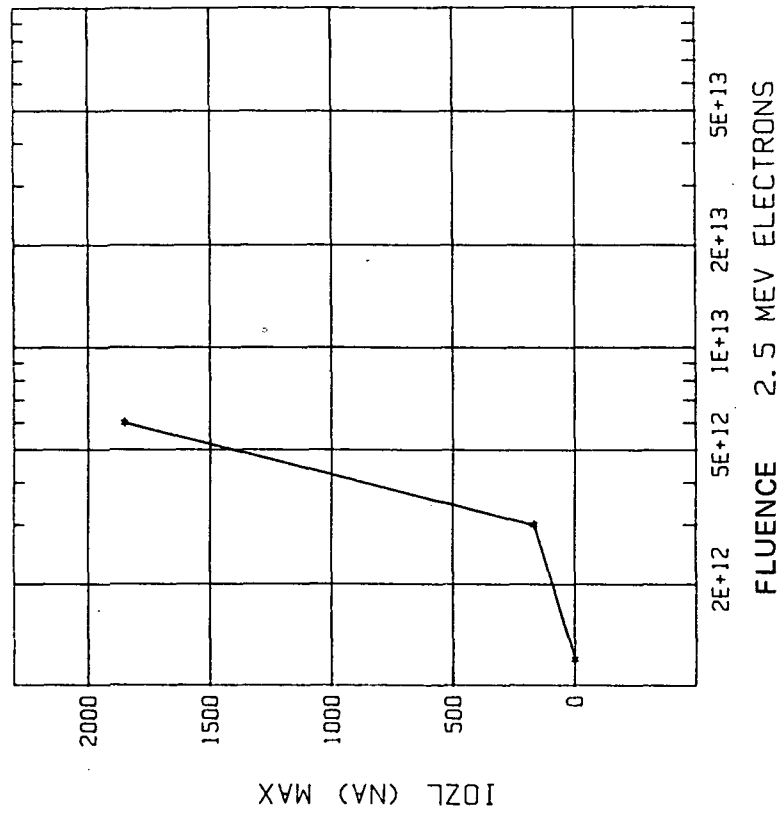
(21) NONLIN (LSB) MAX VS. DOSE
 INITIAL MEAN VALUE NONLIN (LSB) MAX = 1.49

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



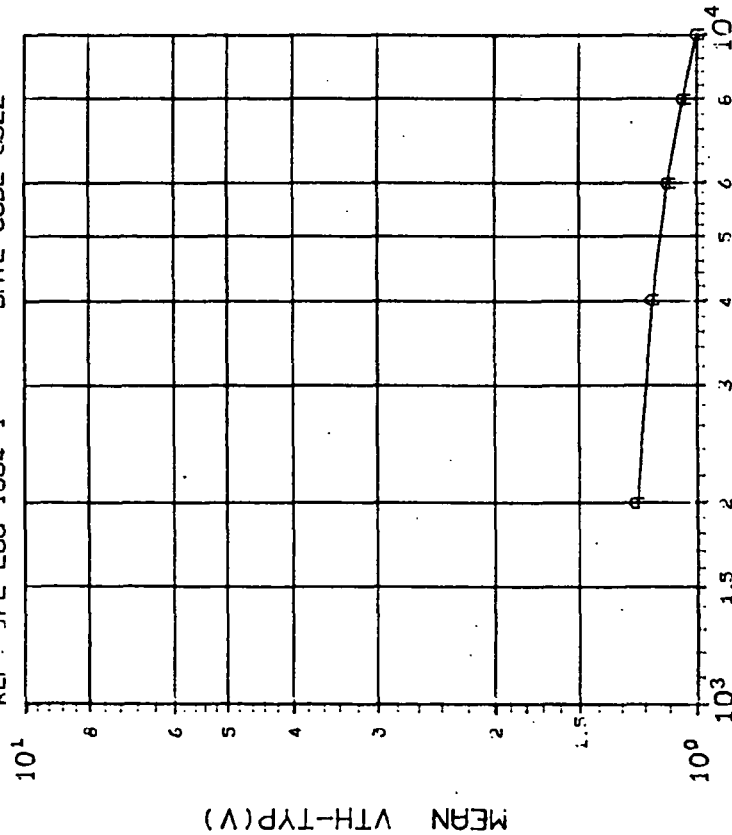
(22) IOZH (NA) MAX VS. DOSE
 INITIAL MEAN VALUE IOZH (NA) MAX = .33

DEVICE TYPE: AD574 12-BIT A/D
 MFG: ADI 3 DEVICE(S) TEST DATE: 12-19-83
 REF: JPL LOG 0971 DATE CODE: -



(23) IOZL (NA) MAX VS. DOSE
 INITIAL MEAN VALUE IOZL (NA) MAX = .0558

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-1 DATE CODE 8322



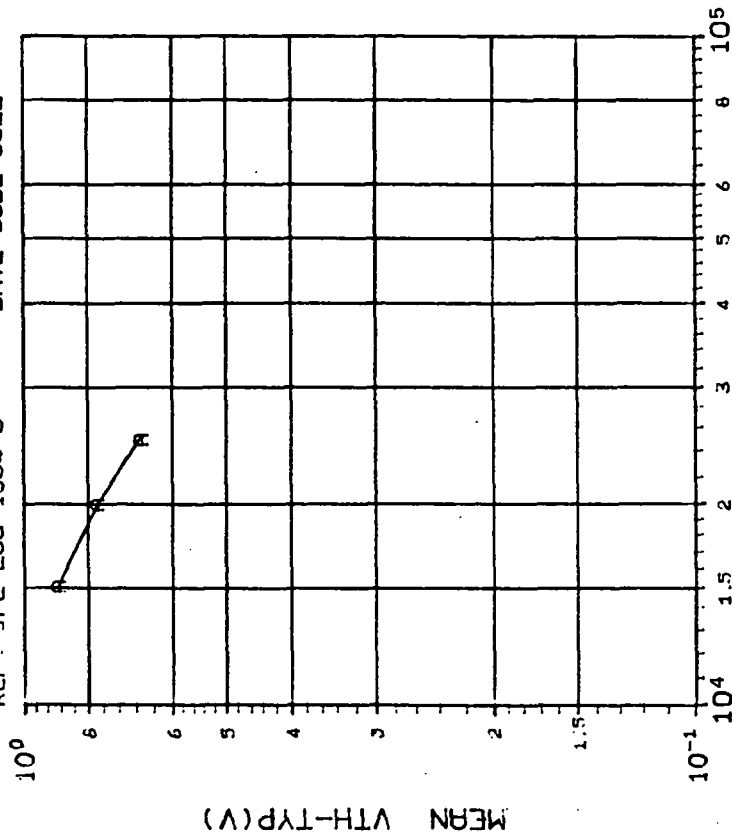
DOSE, rads(Si) Co 60 Gammas

(1) VTH-TYP(VDD=5V) IN V: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 2 | 4 | 6 | 8 |
| A | .0456 | .0367 | .0288 | .0216 |
| | | | | .0277 |
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INITIAL MEAN VALUE VTH-TYP(V) = $1.30 \times 10^{+0}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-3 DATE CODE 8322



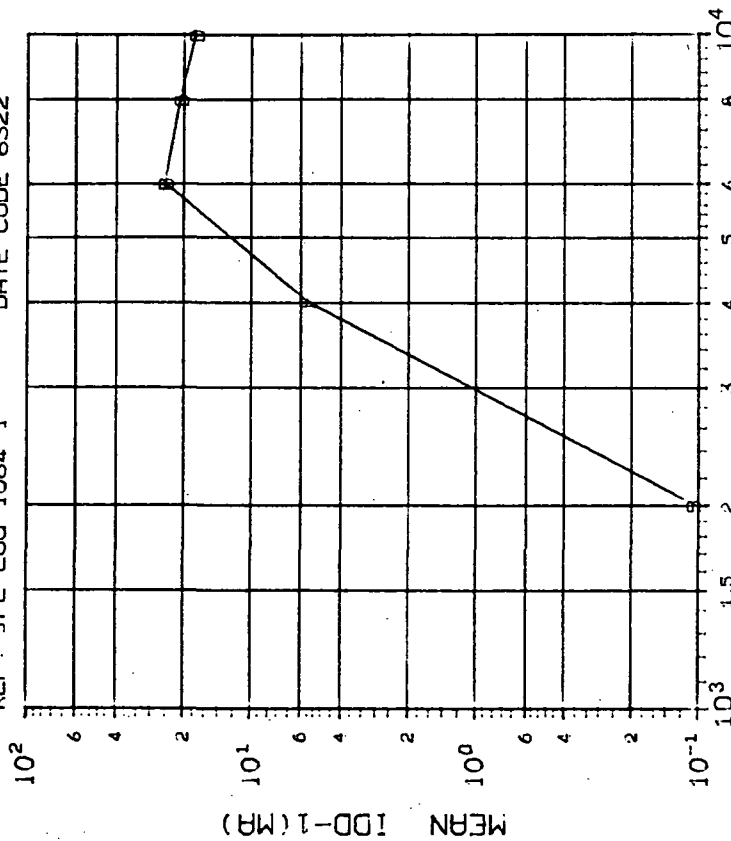
DOSE, rads(Si) Co 60 Gammas

(1) VTH-TYP(VDD=5V) IN V: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 13 | 20 | 25 | 50 |
| A | .0200 | .0164 | .0173 | ***** |

INITIAL MEAN VALUE VTH-TYP(V) = $1.30 \times 10^{+0}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-1 DATE CODE 8322



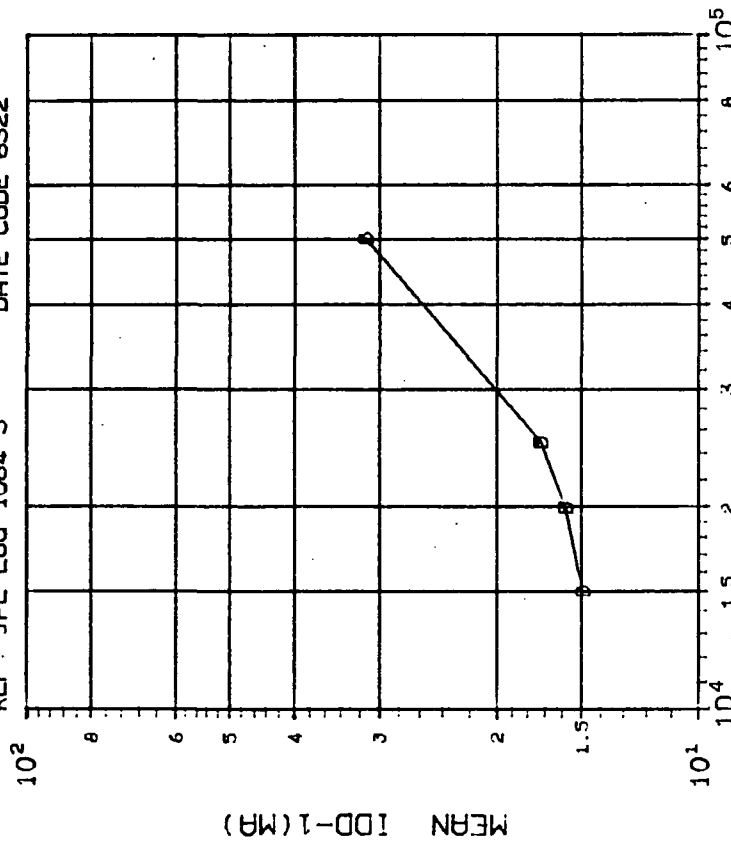
DOSE, rads(Si) Co⁶⁰ Gammas

(2)IDD-1 (VIN=OV) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 2 |
| | 4 |
| | 6 |
| | 8 |
| | 10 |
| | .0575 1.362 4.908 1.782 1.293 |

INITIAL MEAN VALUE IDD-1(MA) = 5.34×10^{-2}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-3 DATE CODE 8322



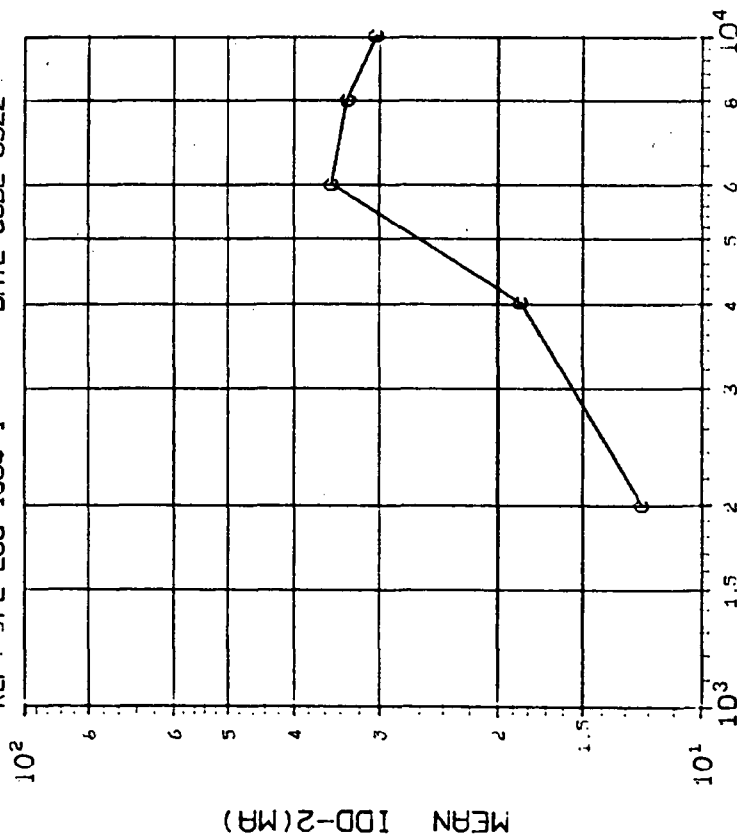
DOSE, rads(Si) Co⁶⁰ Gammas

(2)IDD-1 (VIN=OV) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 15 |
| | 20 |
| | 25 |
| | 50 |
| | 50 |
| | 2.740 1.628 1.716 1.509 |

INITIAL MEAN VALUE IDD-1(MA) = 5.34×10^{-2}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: QD1 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-1 DATE CODE 8322



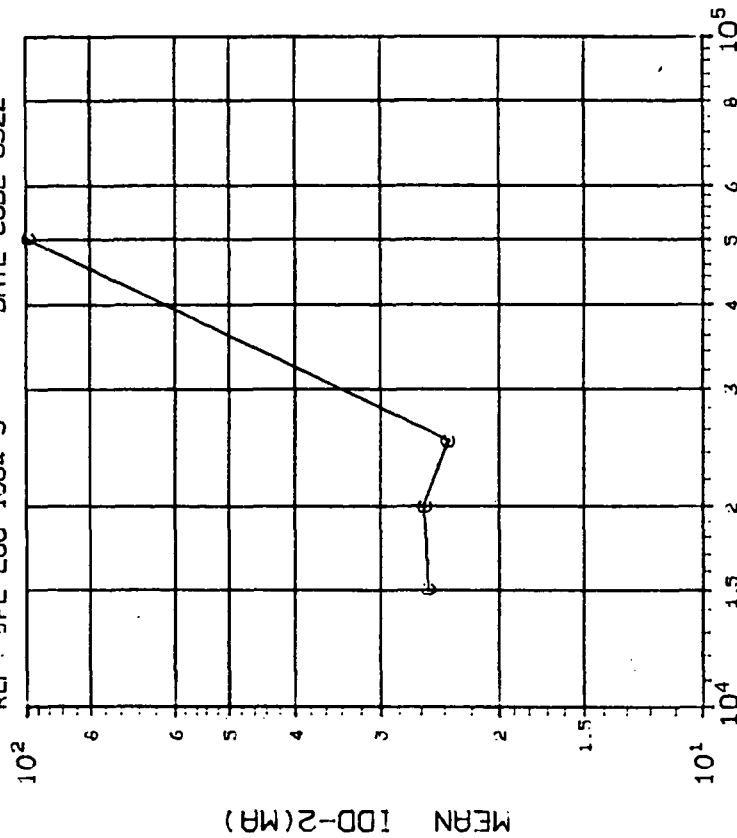
DOSE, rads(Si) Co 60 Gammas

(3)IDD-2 (VIN=2.4V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 2 | 4 | 6 | 8 |
| C | 1.410 | 2.923 | 5.031 | 1.929 |
| | | | | 1.428 |
| | | | | 10 |

INITIAL MEAN VALUE IDD-2(MA) = $1.27 \times 10^{+1}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: QD1 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-3 DATE CODE 8322



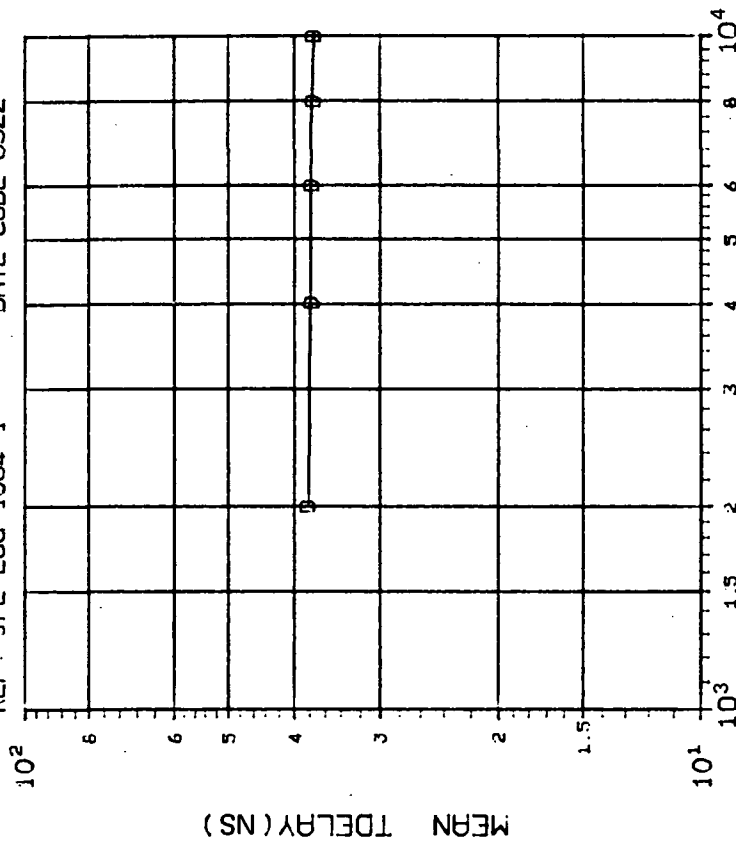
DOSE, rads(Si) Co 60 Gammas

(3)IDD-2 (VIN=2.4V) IN MA: VS DOSE

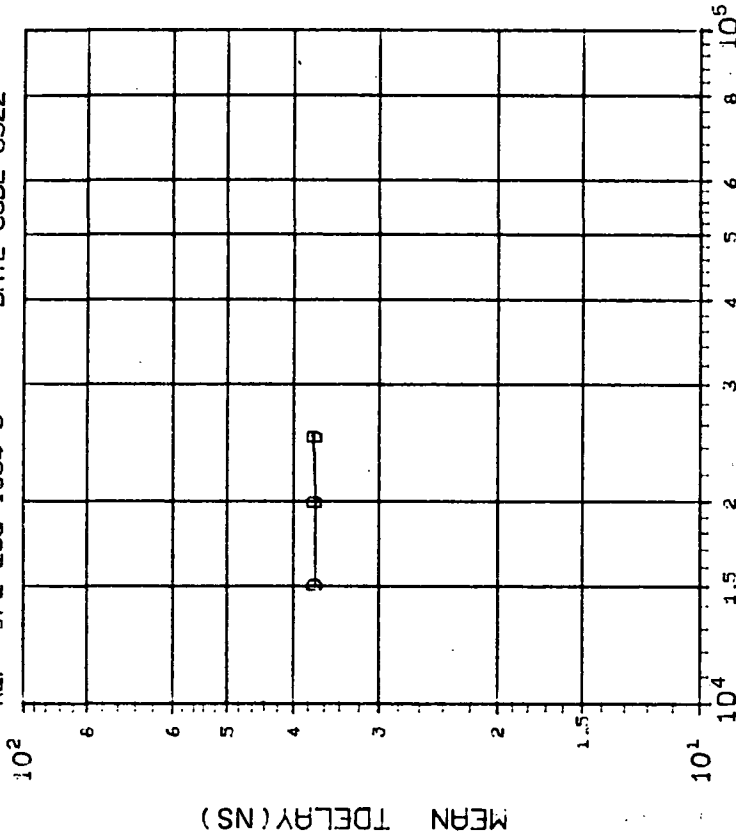
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 15 | 20 | 25 | 50 |
| C | 1.076 | 1.320 | 1.068 | .0289 |

INITIAL MEAN VALUE IDD-2(MA) = $1.27 \times 10^{+1}$

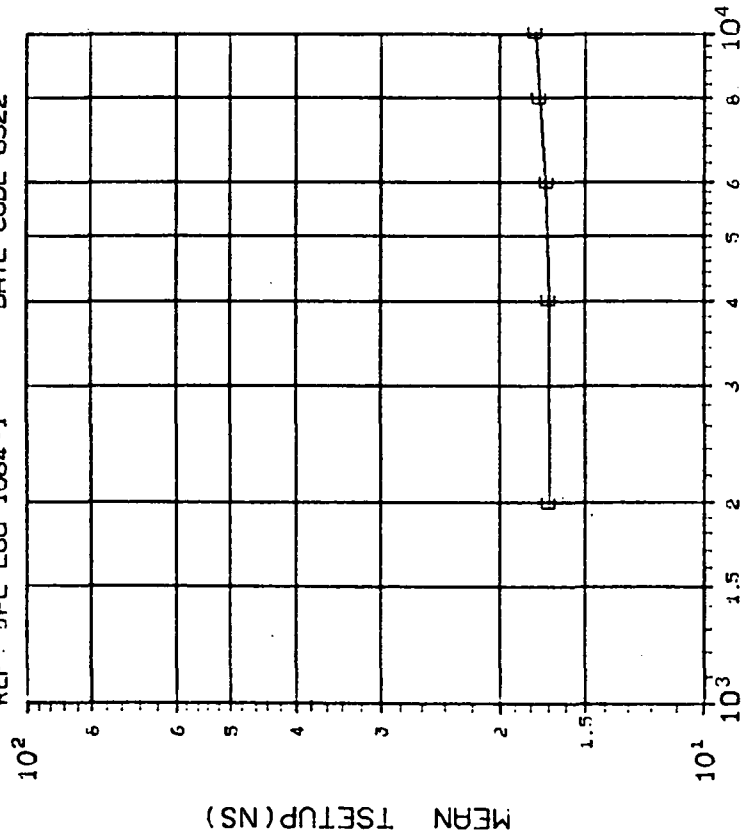
DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-1 DATE CODE 8322



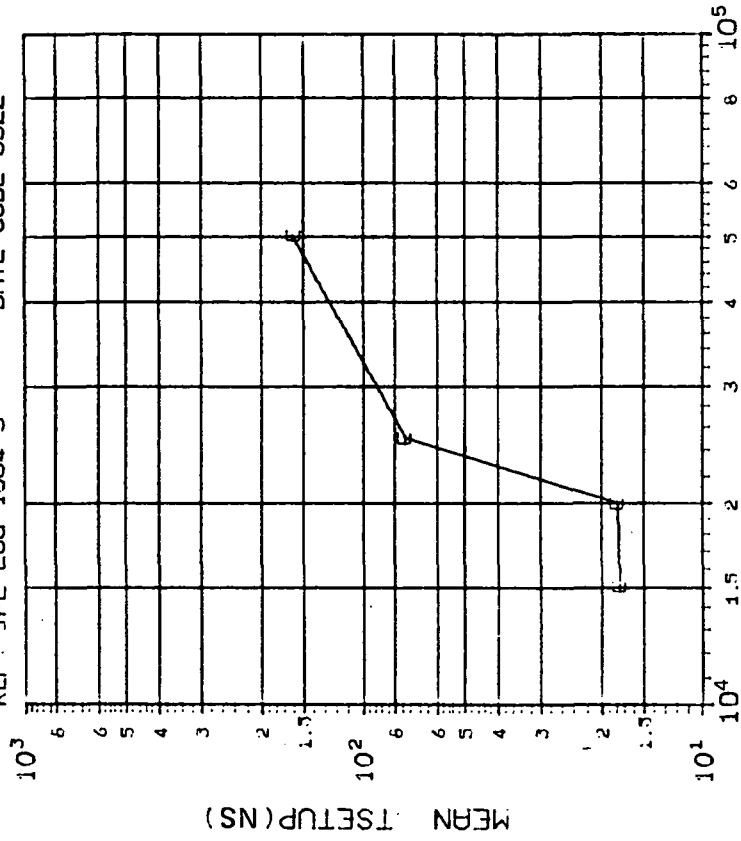
DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-3 DATE CODE 8322



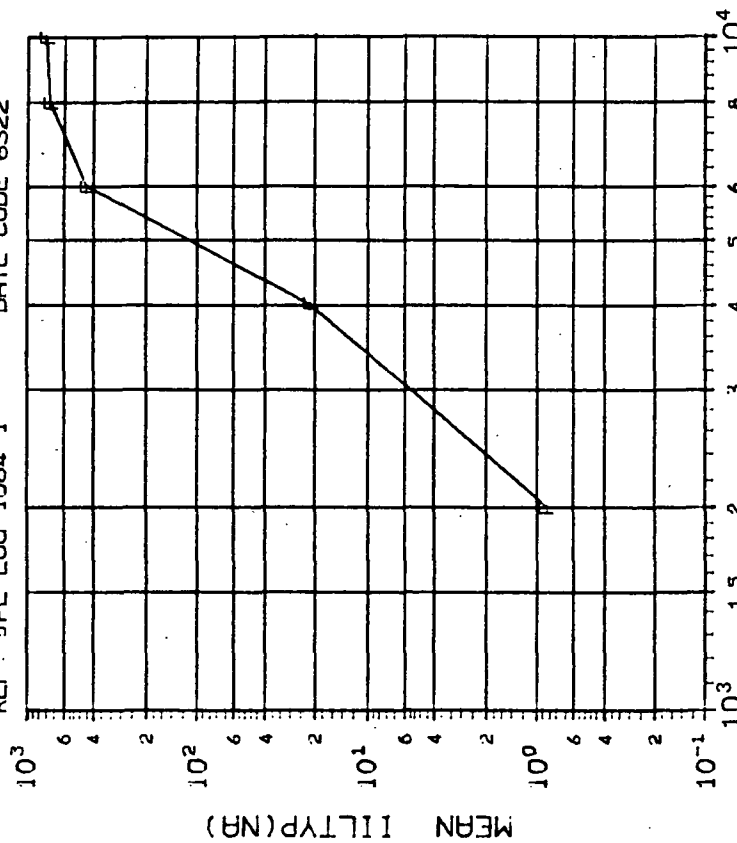
DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-1 DATE CODE 8322



DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-3 DATE CODE 8322



DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: QDI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-1 DATE CODE 8322



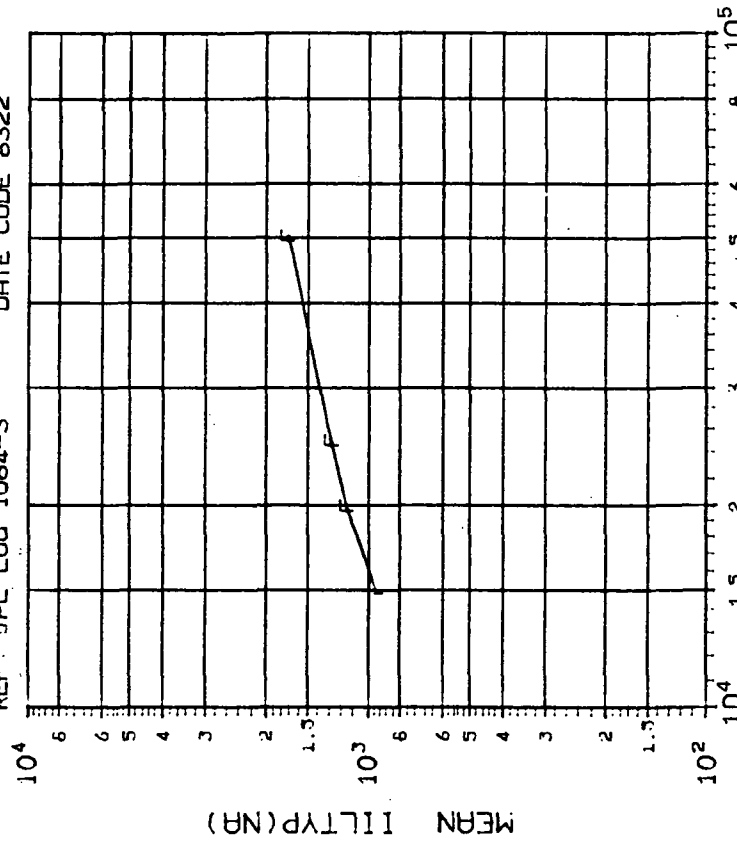
DOSE, rads(Si) Co⁶⁰ Gammas

(6) IILTYP(VINE-GND) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| F | 2 4 6 8 10 |
| | .1134 14.68 135.2 486.8 474.2 |

INITIAL MEAN VALUE IILTYP(NA) = 9.64X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: QDI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-3 DATE CODE 8322



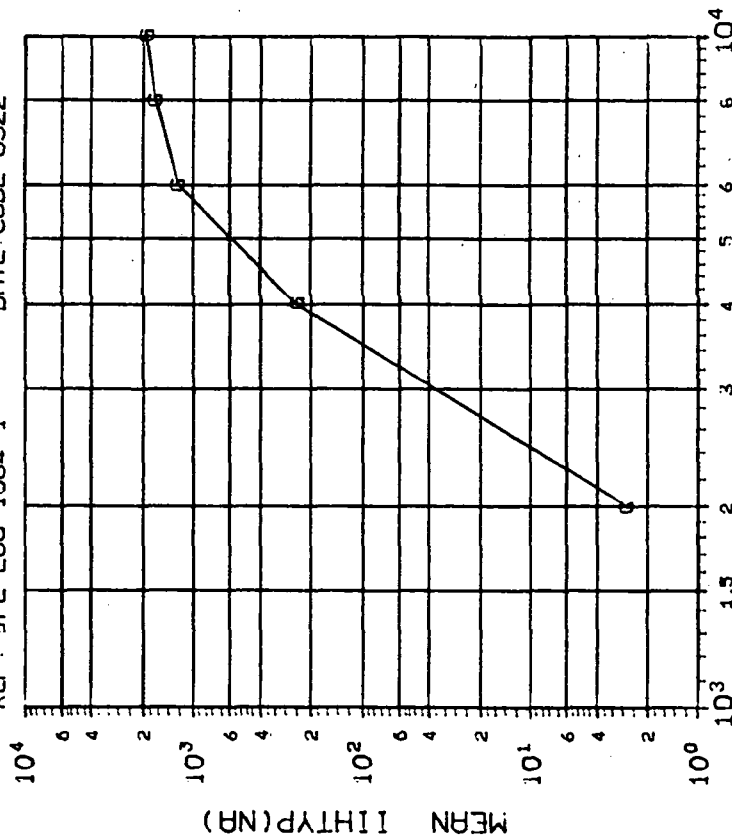
DOSE, rads(Si) Co⁶⁰ Gammas

(6) IILTYP(VINE-GND) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| F | 15 20 25 50 |
| | 650.3 618.3 579.6 219.3 |

INITIAL MEAN VALUE IILTYP(NA) = 9.64X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-1 DATE CODE 8322



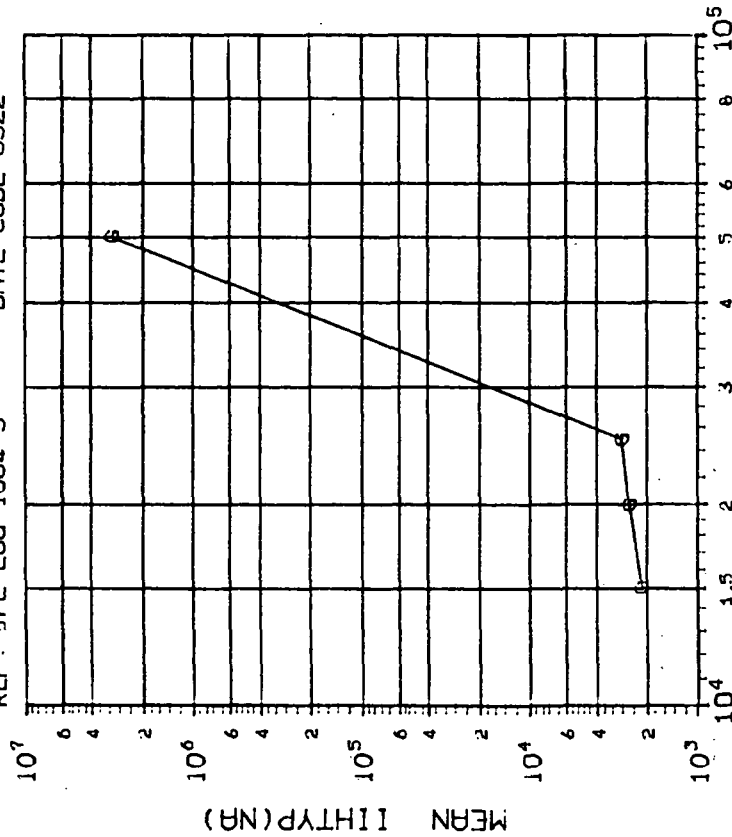
DOSE, rads(Si) Co 60 Gammas

(7)I1HTYP(VIN=5V) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 2 | 4 |
| G | 1.156 | 52.51 |
| | 230.7 | 168.7 |
| | 178.6 | |

INITIAL MEAN VALUE I1HTYP(NA) = ****X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-3 DATE CODE 8322



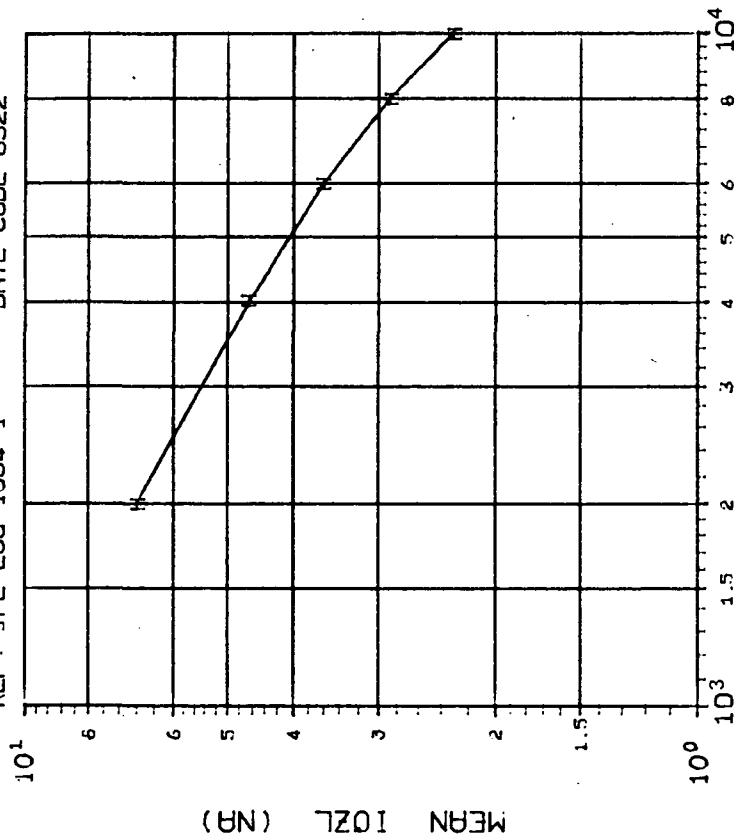
DOSE, rads(Si) Co 60 Gammas

(7)I1HTYP(VIN=5V) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 15 | 25 |
| G | 218.5 | 232.3 |
| | 219.6 | **** |

INITIAL MEAN VALUE I1HTYP(NA) = ****X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-1 DATE CODE 8322



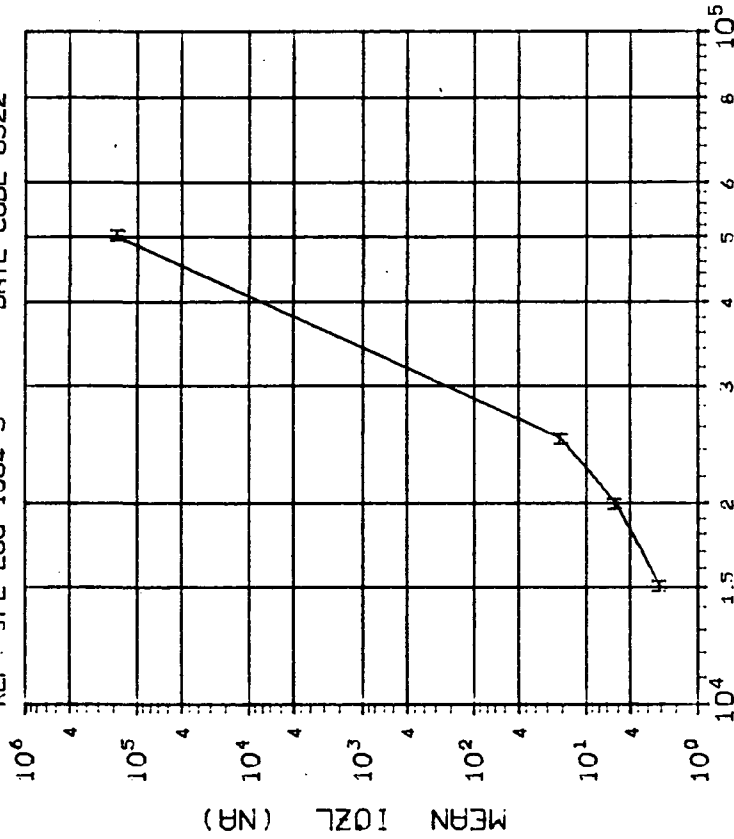
DOSE, rad(Si) Co⁶⁰ Gammas

(8) IOZLTYP(VL=GND) IN NA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 2 | 4 | 6 | 8 |
| H | 6.114 | 4.023 | 3.111 | 1.930 |
| | | | | 1.394 |

INITIAL MEAN VALUE IOZL (NA) = $1.16 \times 10^{+1}$

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-3 DATE CODE 8322



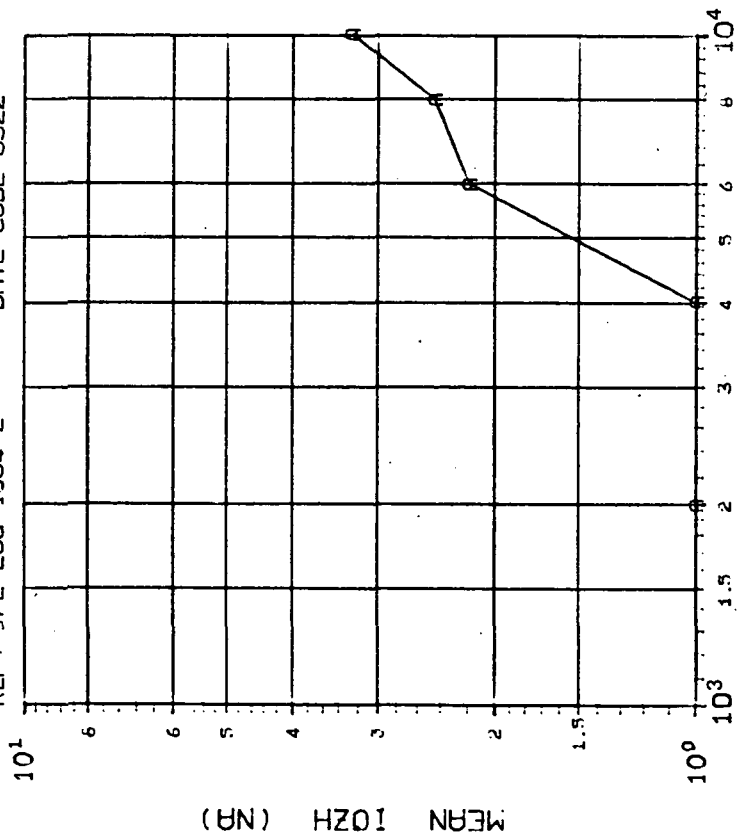
DOSE, rad(Si) Co⁶⁰ Gammas

(8) IOZLTYP(VL=GND) IN NA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 15 | 20 | 25 | 50 |
| H | .9172 | 1.070 | 3.746 | **** |

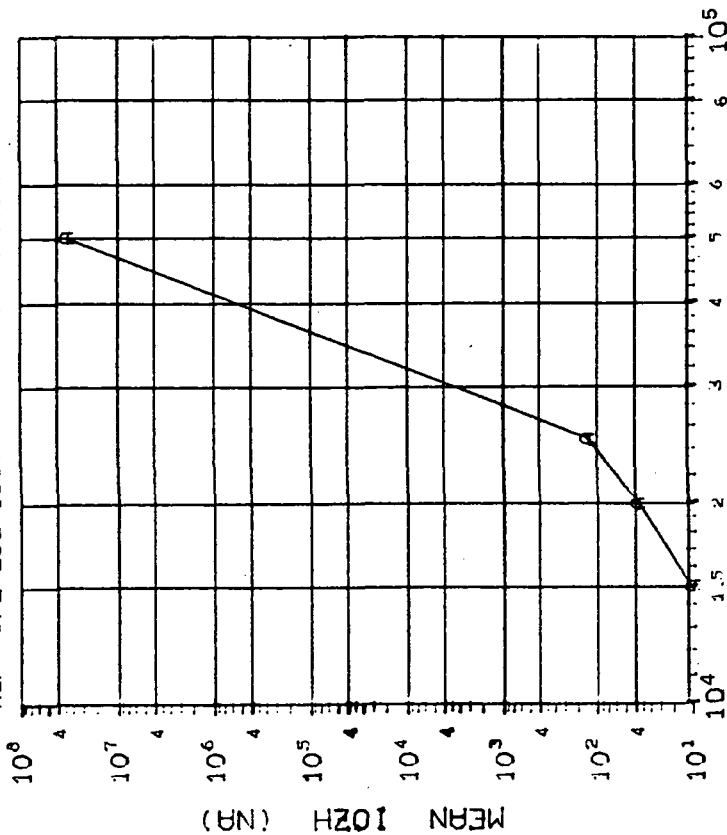
INITIAL MEAN VALUE IOZL (NA) = $1.16 \times 10^{+1}$

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-2 DATE CODE 8322



DOSE, rads(Si) Co⁶⁰ Gammas
 (1)10ZHTYP(V0=5V) IN NA: VS DOSE
 INITIAL MEAN VALUE 10ZH (NA) = ****X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-4 DATE CODE 8322

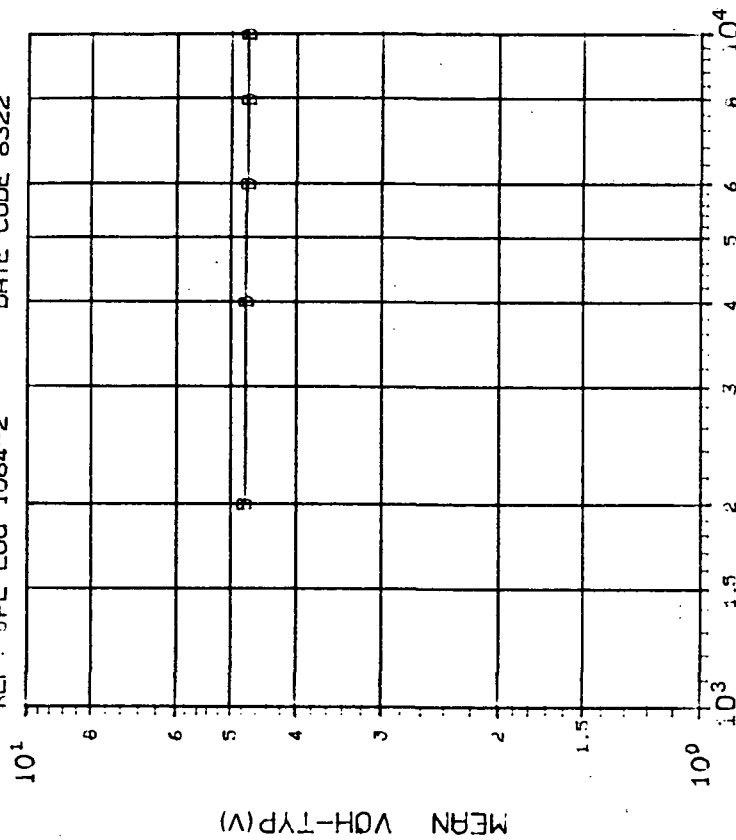


DOSE, rads(Si) Co⁶⁰ Gammas
 (1)10ZHTYP(V0=5V) IN NA: VS DOSE
 INITIAL MEAN VALUE 10ZH (NA) = ****X10⁻¹

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 15 | 20 | 25 |
| 9 | 1.745 | 7.372 | 28.71 |

INITIAL MEAN VALUE 10ZH (NA) = ****X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-2 DATE CODE 8322



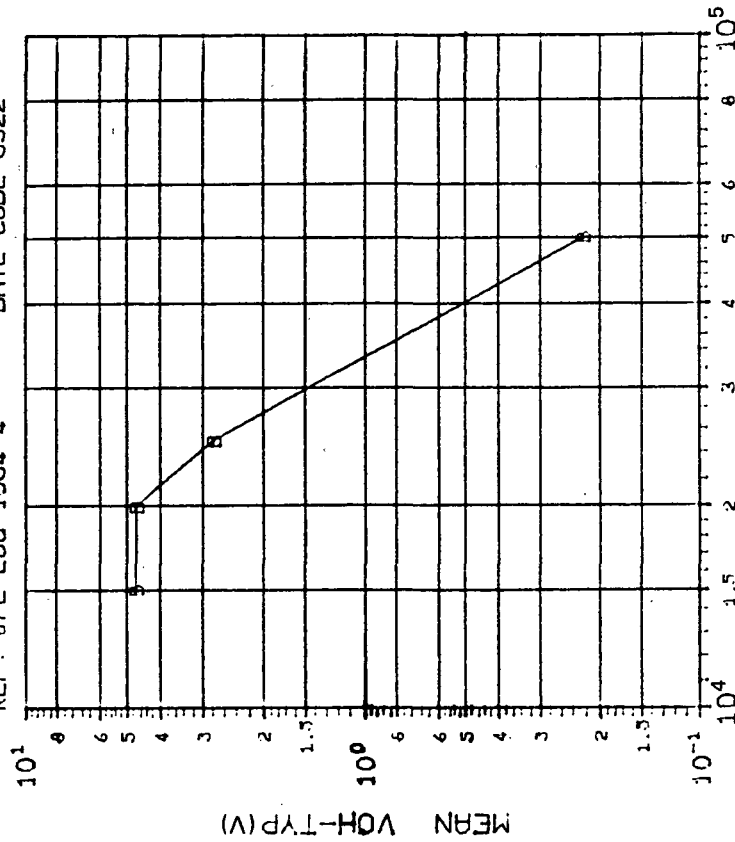
DOSE, rads(Si) Co⁶⁰ Gammas

(2) VOH-TYP(10H=1MA) IN V: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) | |
| B | 2 4 6 8 10 | .0030 .0022 .0143 .0073 .0049 |

INITIAL MEAN VALUE VOH-TYP(V) = 4.78X10⁻³

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-4 DATE CODE 8322



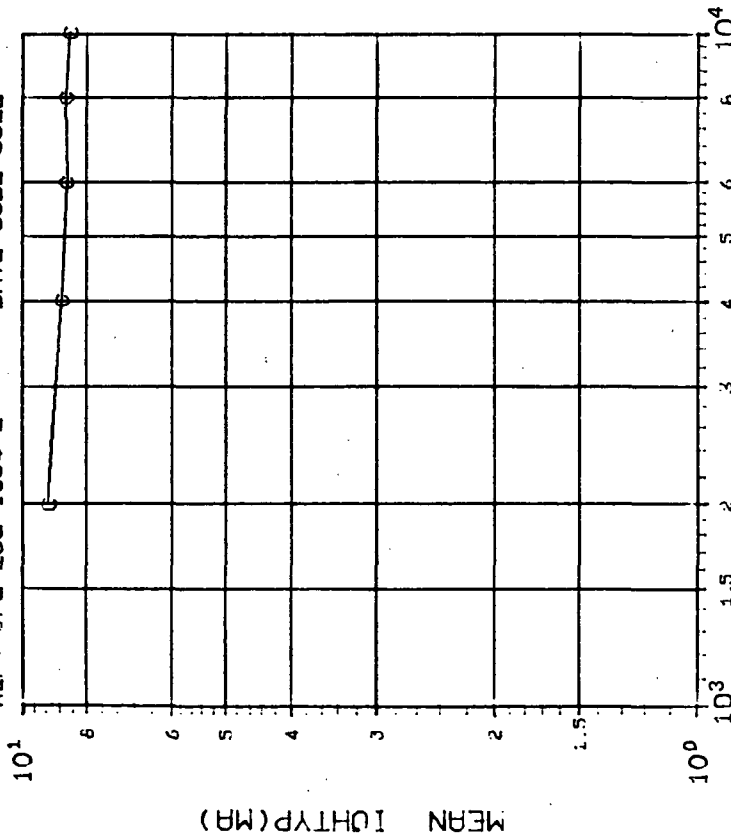
DOSE, rads(Si) Co⁶⁰ Gammas

(2) VOH-TYP(10H=1MA) IN V: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| B | 15 20 25 50 | .0101 .0099 2.639 .0350 |

INITIAL MEAN VALUE VOH-TYP(V) = 4.78X10⁻³

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-2 DATE CODE 8322



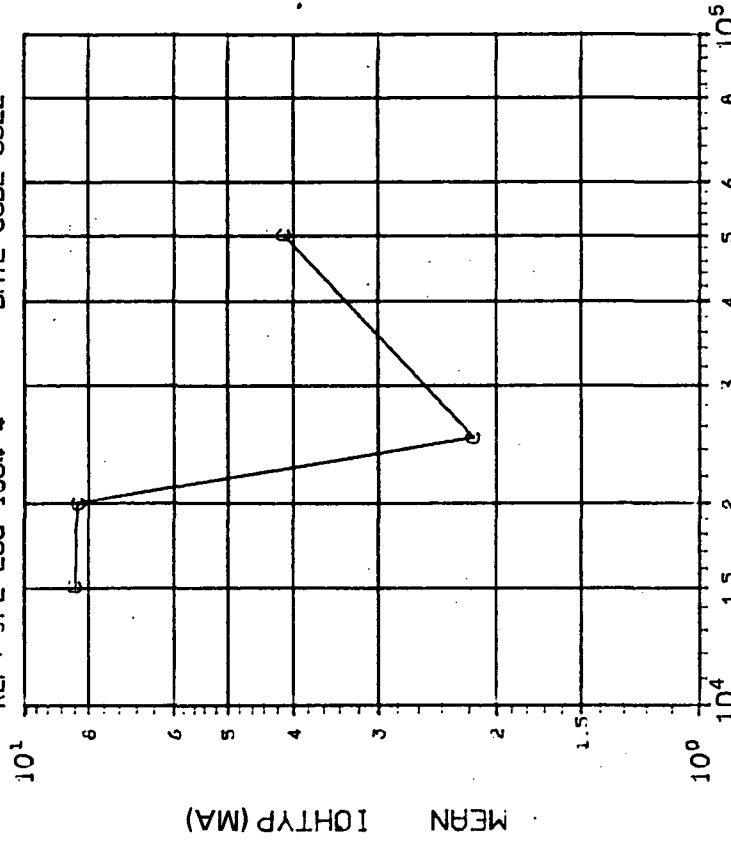
DOSE, rads(Si) Co⁶⁰ Gammas

(31)IQHTYP(V0=2.4) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | |
|-------------------------------------|--------------------|-------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | | |
| | 2 | 4 | 6 | 8 | 10 |
| C | .2350 | .4260 | .1643 | .1089 | .2904 |

INITIAL MEAN VALUE IQHTYP(MA) = 9.23×10^{-9}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-4 DATE CODE 8322



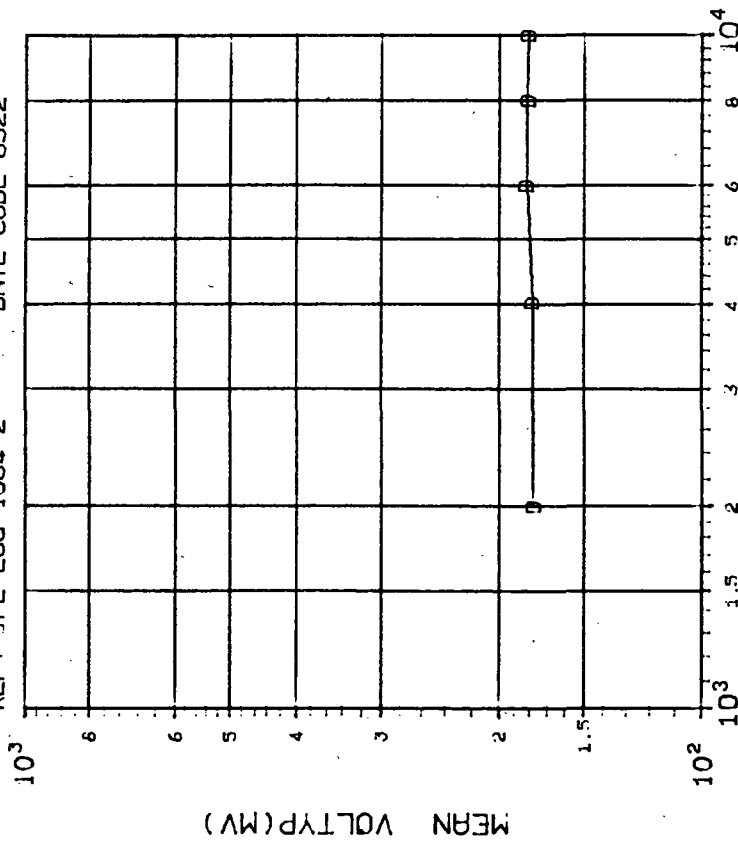
DOSE, rads(Si) Co⁶⁰ Gammas

(3)IQHTYP(V0=2.4V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 15 | 20 | 25 | 50 |
| C | .3348 | .3168 | 8.174 | 2.029 |

INITIAL MEAN VALUE IQHTYP(MA) = 9.23×10^{-9}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-2 DATE CODE 8322



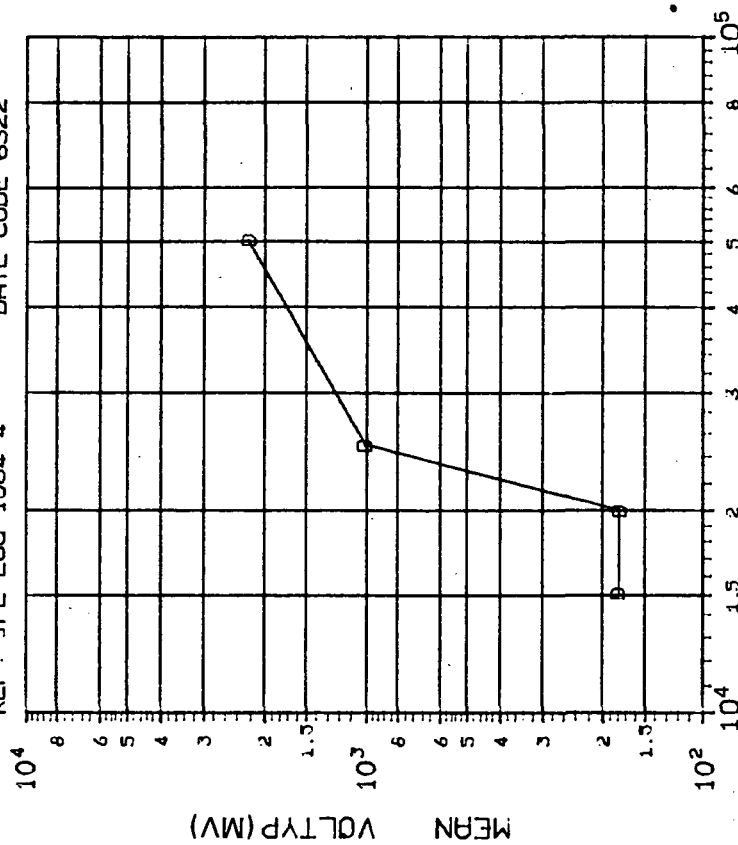
DOSE, rads(Si) Co 60 Gammas

(4) VOLTYP(10L=4MA) IN MV: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | | |
|-------------------------------------|--------------------|-------|-------|-------|-------|--|
| CURVE | DOSE, kilorads(Si) | | | | | |
| | 2 | 4 | 6 | 8 | 10 | |
| D | 4.636 | 4.612 | 5.371 | 3.589 | 3.372 | |

INITIAL MEAN VALUE VOLTYP(MV) = $1.60 \times 10^{+2}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 5 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1064-4 DATE CODE 8322



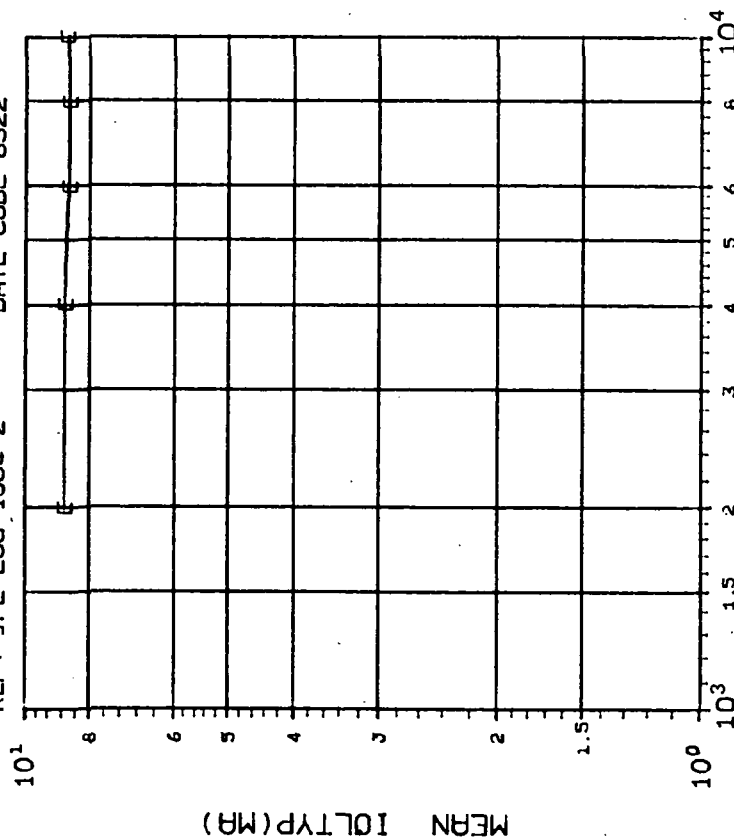
DOSE, rads(Si) Co 60 Gammas

(4) VOLTYP(10L=4MA) IN MV: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 15 | 20 | 25 | 50 |
| D | 2.697 | 3.319 | 1139. | 189.6 |

INITIAL MEAN VALUE VOLTYP(MV) = $1.60 \times 10^{+2}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-2 DATE CODE 8322



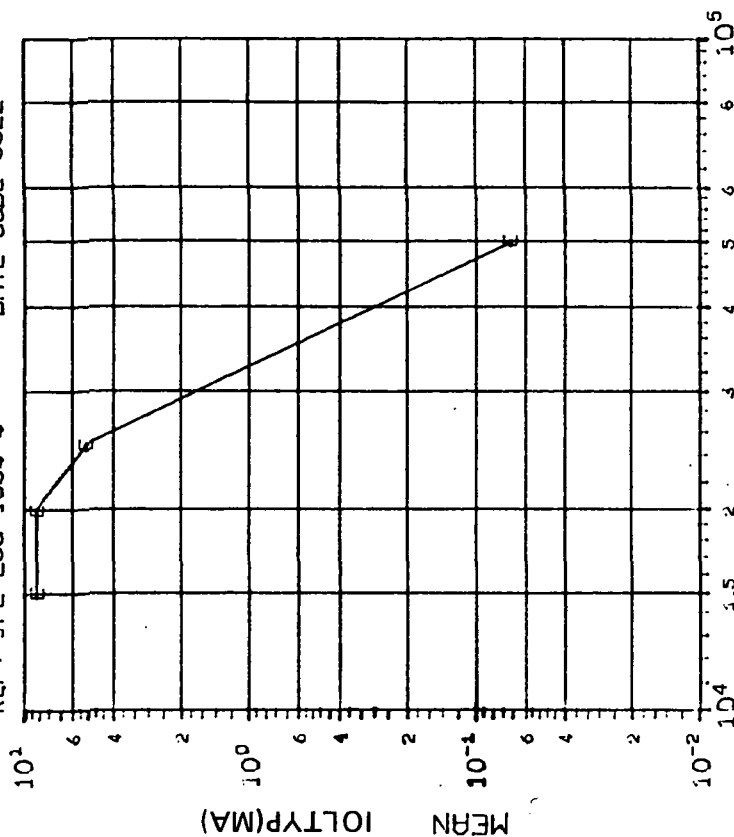
DOSE, rads(Si) Co 60 Gammas

(5) IOLTP(V0=0.4V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | | |
|-------------------------------------|--------------------|-------|-------|-------|-------|--|
| CURVE | DOSE, kilorads(Si) | | | | | |
| | 2 | 4 | 6 | 8 | 10 | |
| E | .2450 | .2392 | .2467 | .1860 | .1731 | |

INITIAL MEAN VALUE IOLTP(MA) = $8.67 \times 10^{+0}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 5 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1064-4 DATE CODE 8322



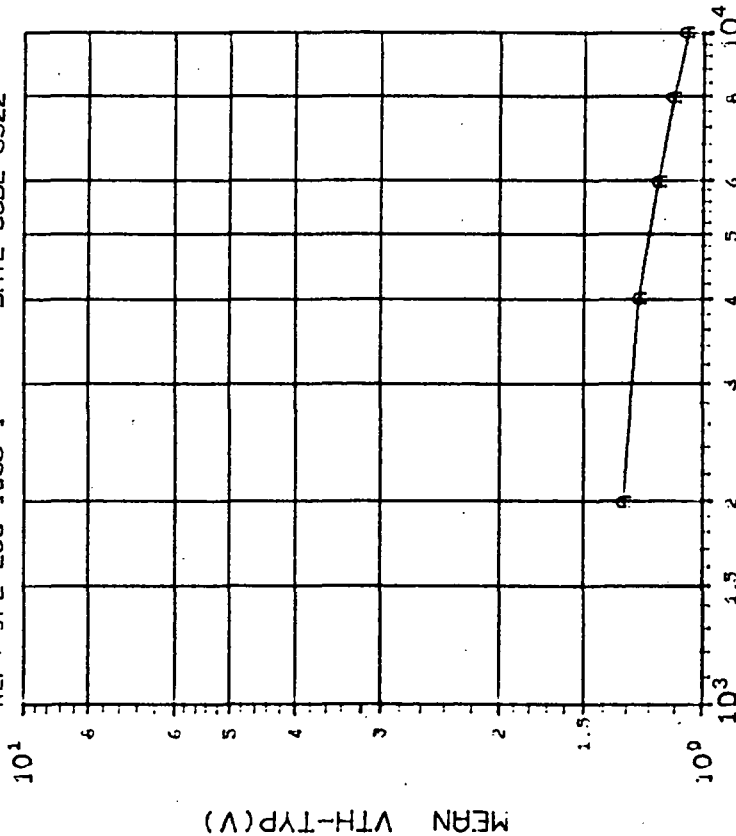
DOSE, rads(Si) Co 60 Gammas

(5) IOLTP(V0=0.4V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 15 | 20 | 25 | 30 |
| E | .1514 | .1728 | 4.664 | .1966 |

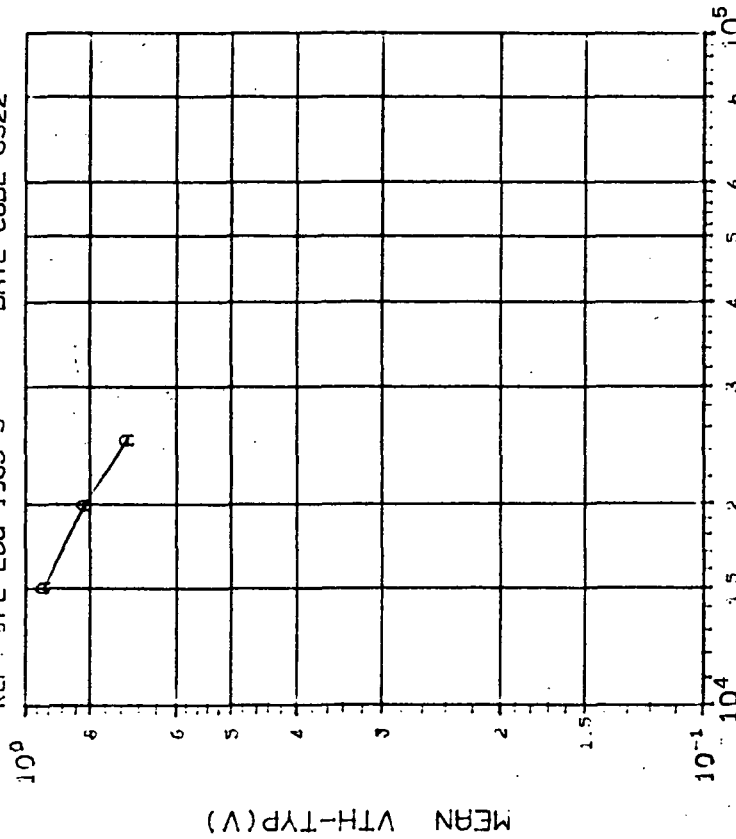
INITIAL MEAN VALUE IOLTP(MA) = $8.67 \times 10^{+0}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-1 DATE CODE 8322



DOSE, rads(Si) Co⁶⁰ Gammas
 (1) VTHCKX(VDD=5V) IN V: VS DOSE
 INITIAL MEAN VALUE VTH-TYP(V) = 1.37X10⁺⁰

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-3 DATE CODE 8322

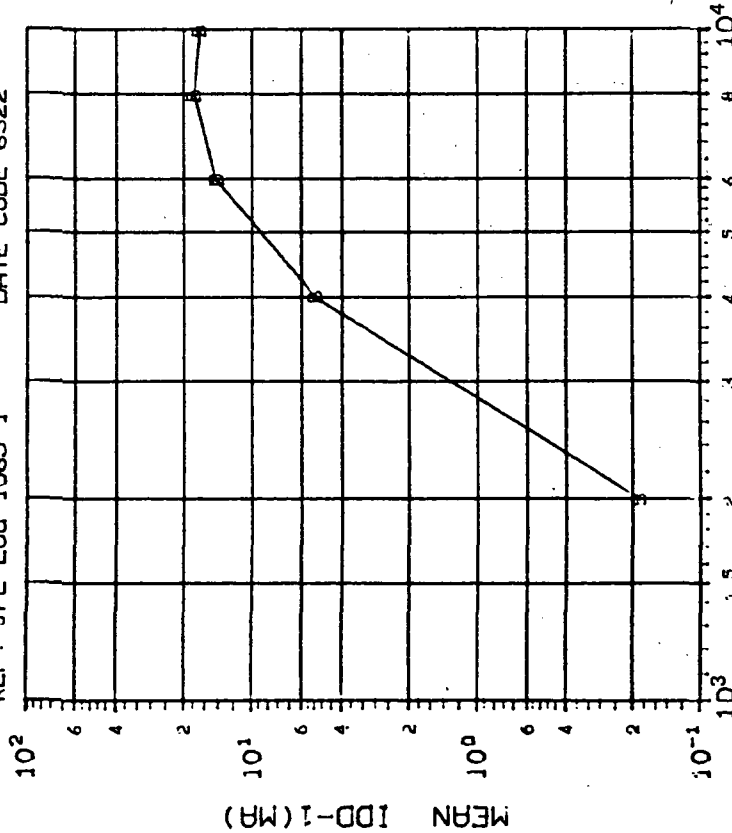


DOSE, rads(Si) Co⁶⁰ Gammas
 (1) VTHCKX(VDD=5V) IN V: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------------|
| CURVE | DOSE, kilorads(Si) | |
| A | 15 | 25 |
| | 20 | 50 |
| | .0173 | .0265 .0361 **** |

INITIAL MEAN VALUE VTH-TYP(V) = 1.37X10⁺⁰

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-1 DATE CODE 8322



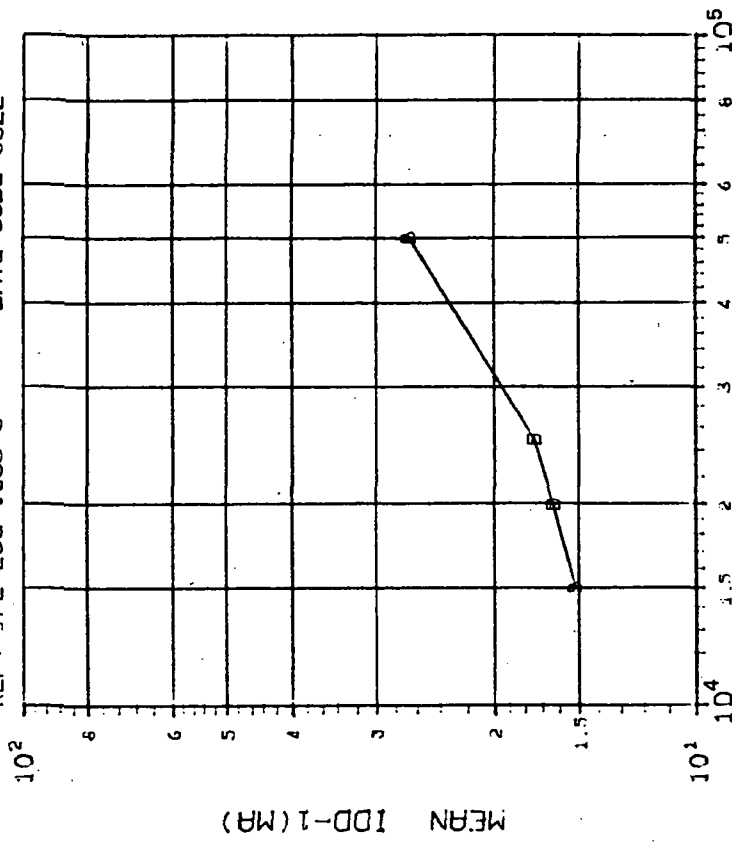
DOSE, rads(Si) Co⁶⁰ Gammas

(2)IDD-1 (VINEOV) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 2 |
| | .4 |
| | 6 |
| | 8 |
| | 10 |
| .1792 .5843 3.172 3.617 2.986 | |

INITIAL MEAN VALUE IDD-1(MA) = 1.33X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-3 DATE CODE 8322



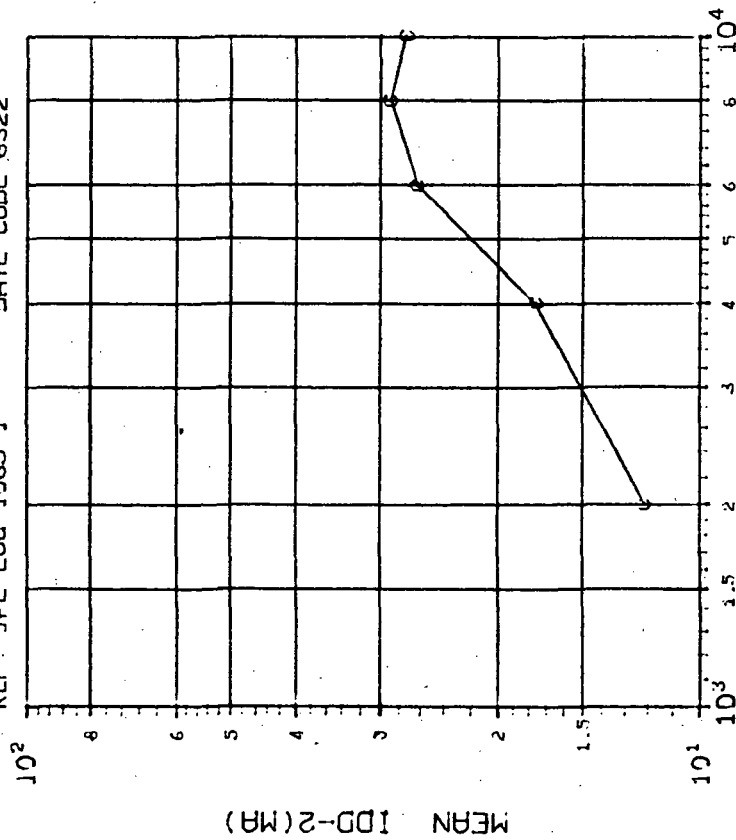
DOSE, rads(Si) Co⁶⁰ Gammas

(2)IDD-1 (VINEOV) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 15 |
| | 20 |
| | 25 |
| | 50 |
| | 50 |
| .5620 .6461 1.739 4.663 | |

INITIAL MEAN VALUE IDD-1(MA) = 1.33X10⁻¹

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADJ 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-1 DATE CODE 8322



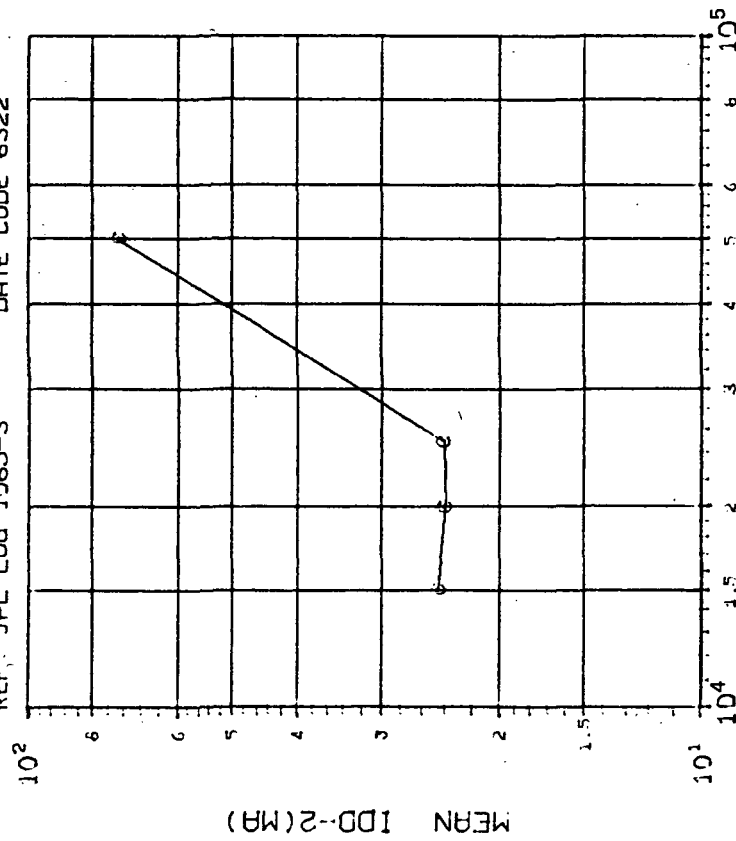
DOSE, rad(Si) Co 60 Gammas

(3)IDD-2 (VIN=2.4V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------------|--|
| CURVE | DOSE, kilorads(Si) | |
| C | 2 4 6 8 10 | |
| | .6331 .6411 2.611 3.276 1.708 | |

INITIAL MEAN VALUE IDD-2(MA) = 1.26×10^{-1}

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADJ 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-3 DATE CODE 8322



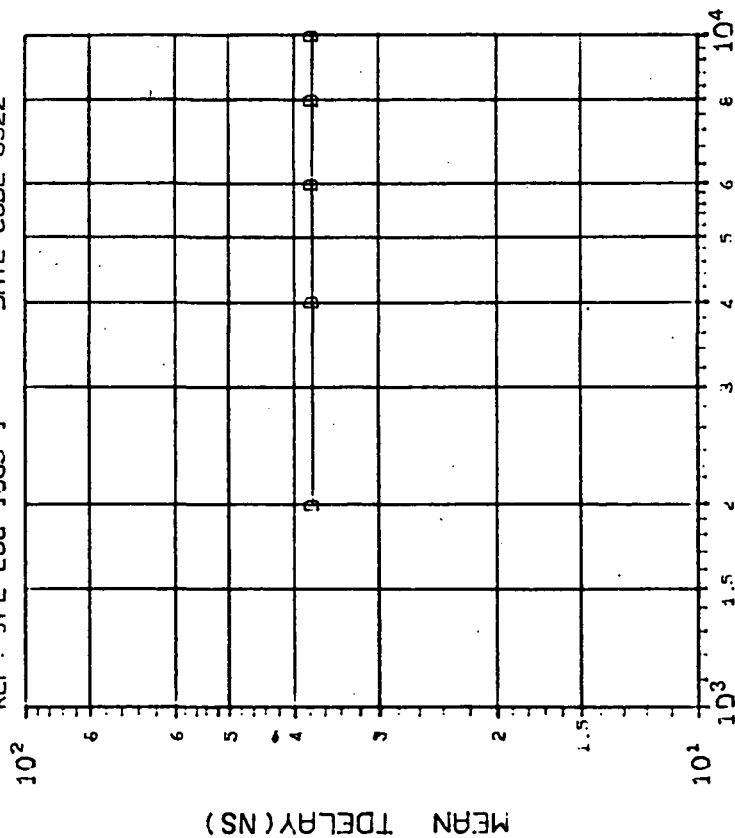
DOSE, rad(Si) Co 60 Gammas

(3)IDD-2 (VIN=2.4V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------|--|
| CURVE | DOSE, kilorads(Si) | |
| C | 15 20 25 50 | |
| | .1500 .7848 1.431 43.88 | |

INITIAL MEAN VALUE IDD-2(MA) = 1.26×10^{-1}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADJ 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-1 DATE CODE 8322



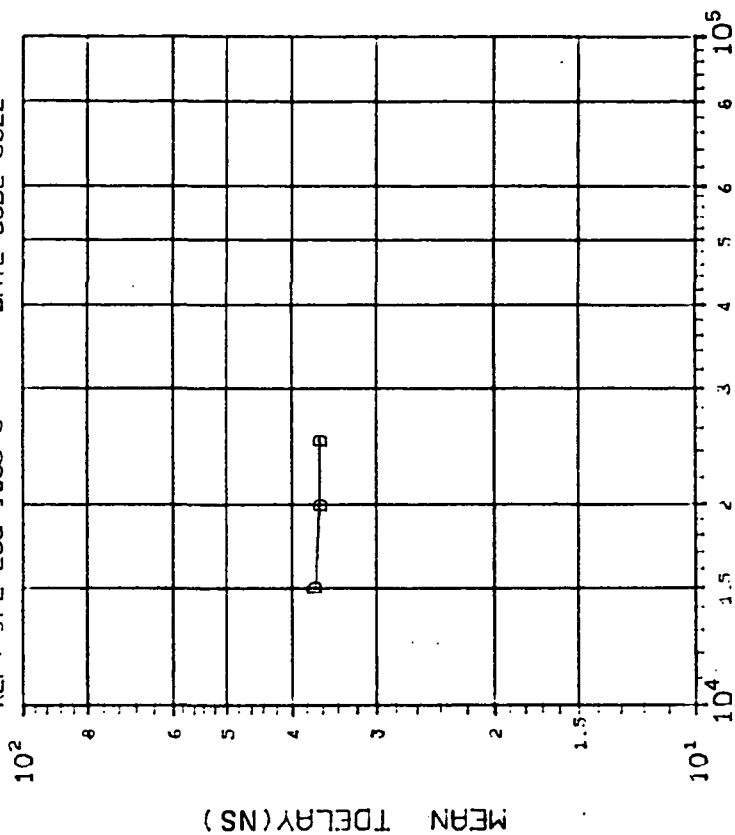
DOSE, rads(Si) Co 60 Gammas

(4) TDELAY (VDD=5V) IN NS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 2 | 4 |
| D | 1.155 | 1.155 |

INITIAL MEAN VALUE TDELAY(NS) = 3.77×10^1

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADJ 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-3 DATE CODE 8322



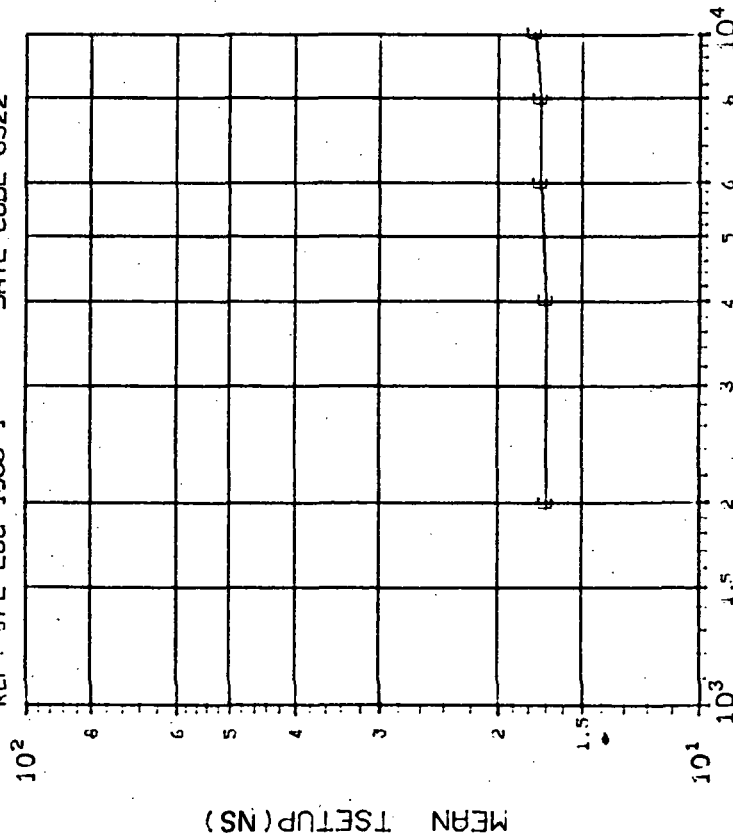
DOSE, rads(Si) Co 60 Gammas

(4) TDELAY (VDD=5V) IN NS: VS DOSE

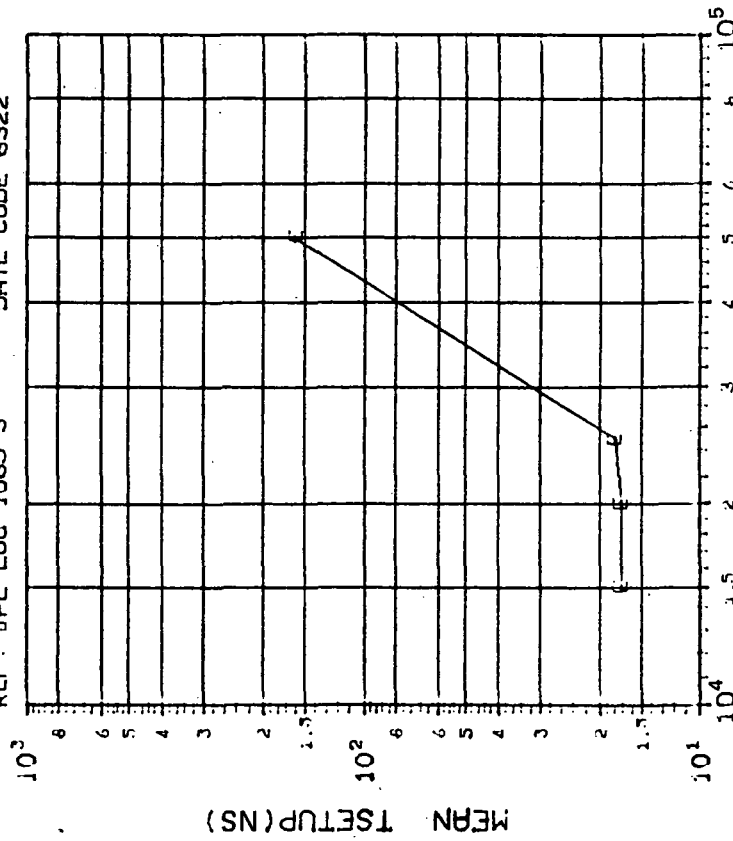
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|--------|
| CURVE | DOSE, kilorads(Si) | |
| | 15 | 20 |
| D | 0.5774 | 0.5774 |

INITIAL MEAN VALUE TDELAY(NS) = 3.77×10^1

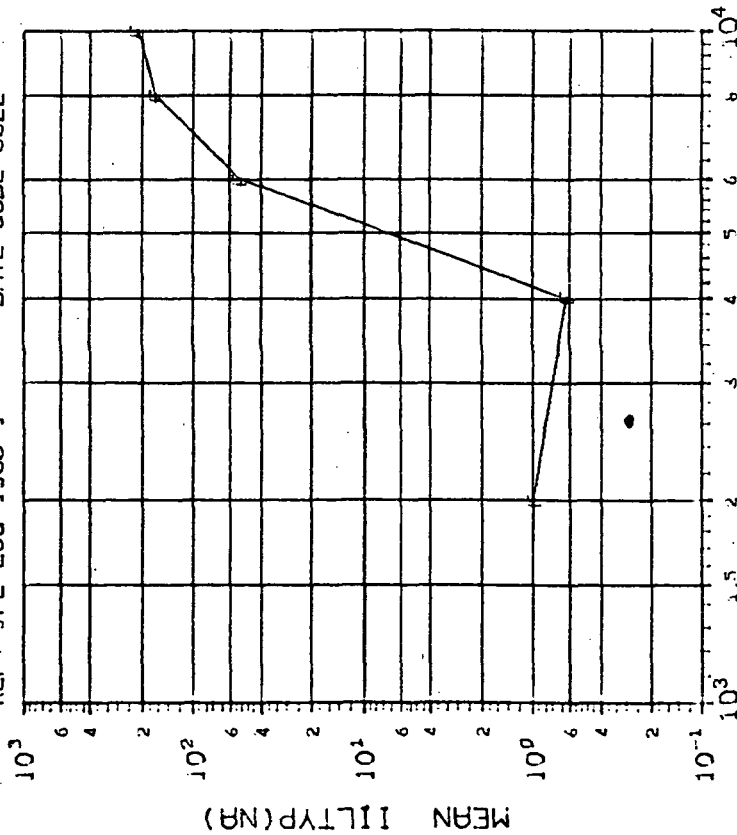
DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-1 DATE CODE 8322



DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: QDI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-3 DATE CODE 8322



DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADJ 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-1 DATE CODE 8322

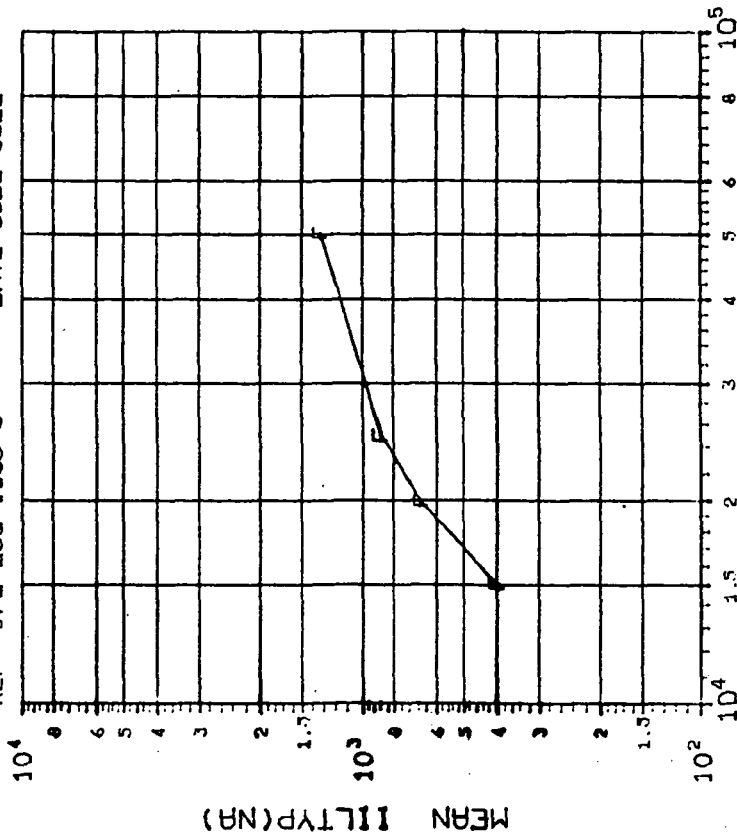


DOSE, rads(Si) Co 60 Gammas

(6)IILTYP(VINE=GND) IN NA: VS DOSE

INITIAL MEAN VALUE IILTYP(NA) = $**** \times 10^{-1}$

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADJ 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-3 DATE CODE 8322



DOSE, rads(Si) Co 60 Gammas

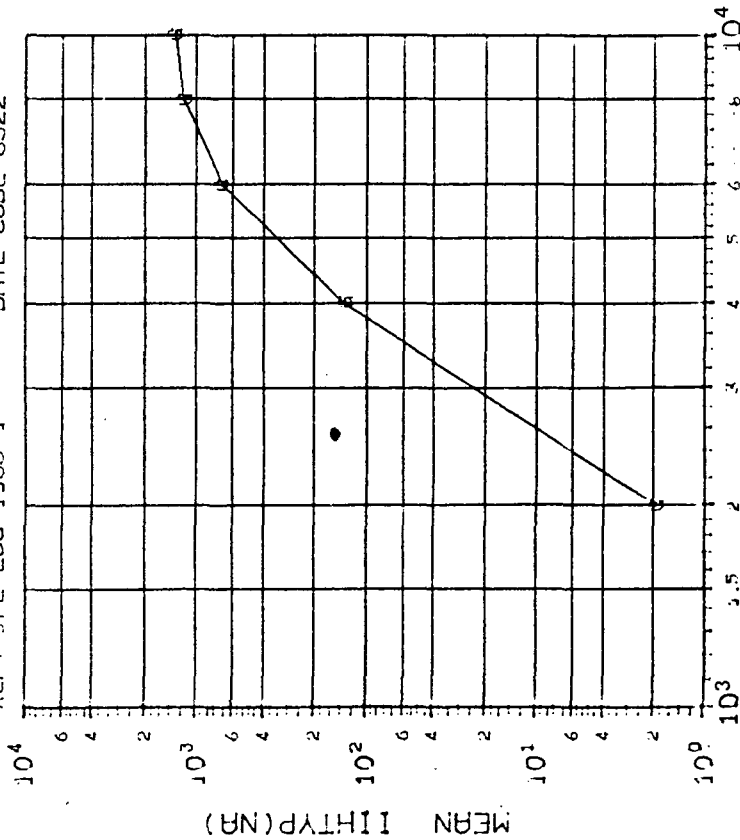
(6)IILTYP(VINE=GND) IN NA: VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, Kilorads(Si) |
|-------|-------------------------|
| | 15 20 25 50 |
| F | 316.5 533.2 632.5 933.5 |

INITIAL MEAN VALUE IILTYP(NA) = $**** \times 10^{-1}$

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-1 DATE CODE 8322



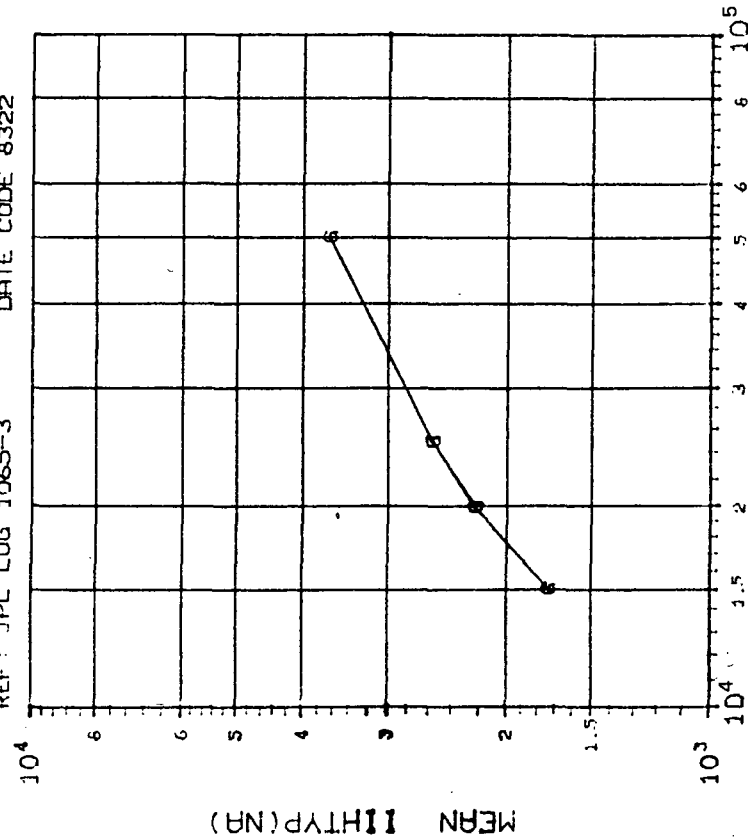
DOSE, rads(Si) Co60 Gammas

(7)IITYP(VIN=5V) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) | |
| G | 2 4 6 8 10 | 1.643 45.11 184.6 406.7 336.2 |

INITIAL MEAN VALUE IITYP(NA) = ****X10⁻¹

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-3 DATE CODE 8322



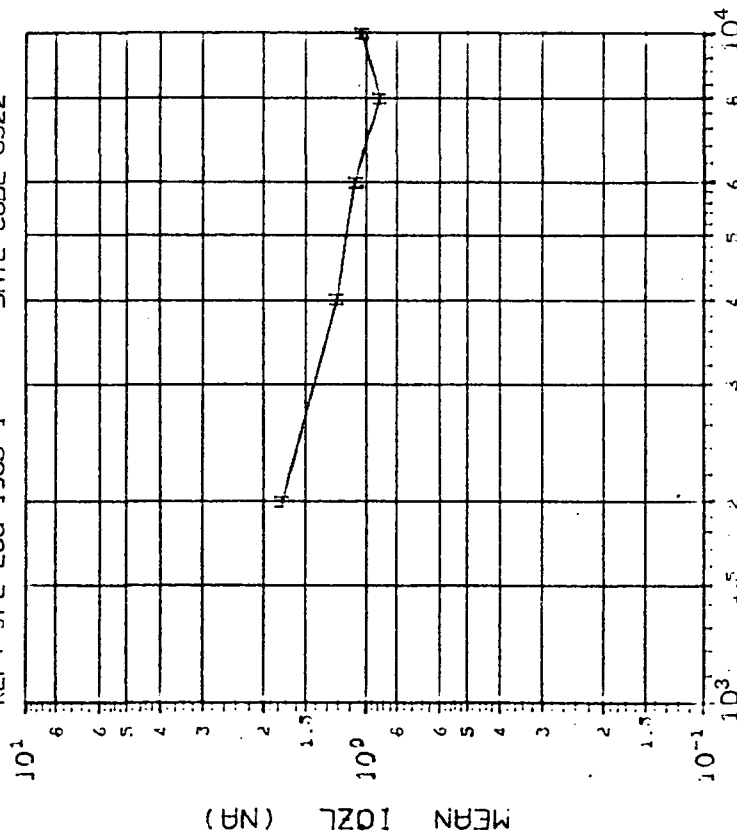
DOSE, rads(Si) Co60 Gammas

(7)IITYP(VIN=5V) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| G | 15 20 25 50 | 288.6 306.2 364.1 751.4 |

INITIAL MEAN VALUE IITYP(NA) = ****X10⁻¹

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-1 DATE CODE 8322

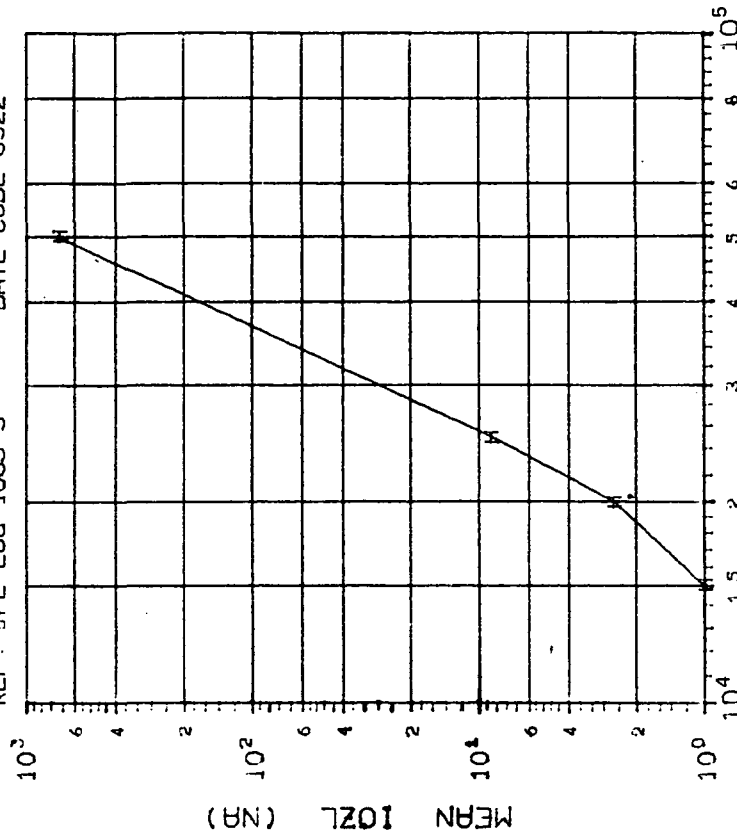


(8) IOZLTYP (VL=GND) IN NA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|----|
| CURVE | DOSE, kilorads(Si) | |
| H | 2 | 4 |
| | 6 | 10 |
| .6739 .5149 .3220 .3737 .2468 | | |

INITIAL MEAN VALUE IOZL (NA) = 2.87×10^{-9}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-3 DATE CODE 8322

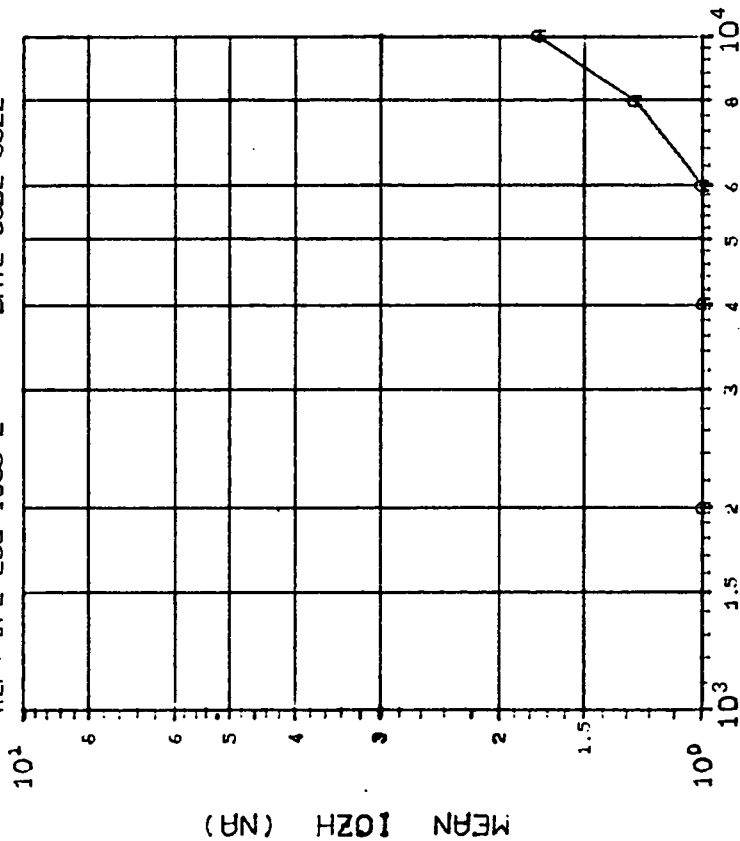


(8) IOZLTYP (VL=GND) IN NA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|----|
| CURVE | DOSE, kilorads(Si) | |
| H | 15 | 20 |
| | 25 | 50 |
| .0075 .4698 1.734 165.7 | | |

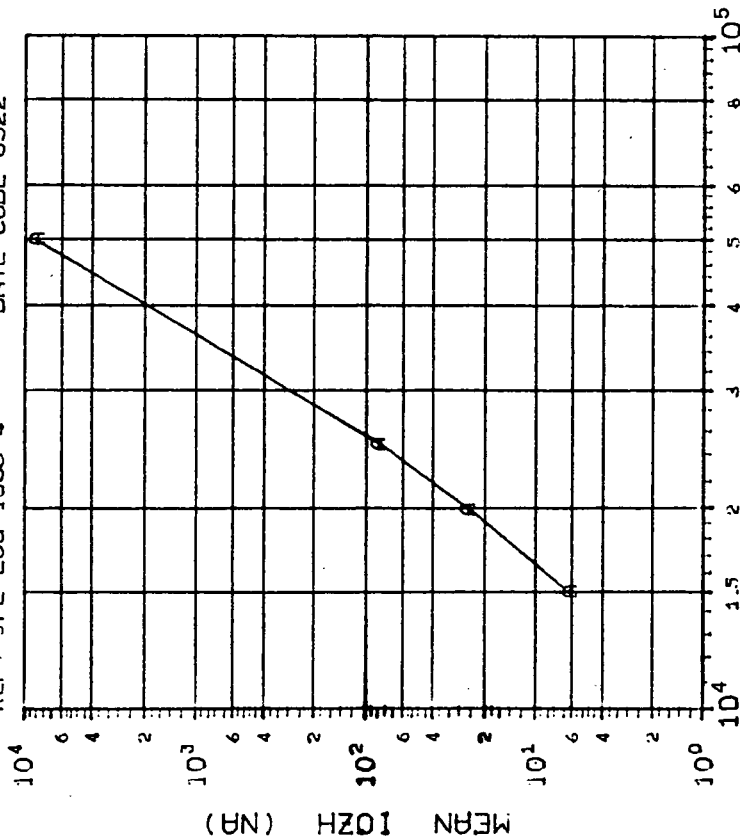
INITIAL MEAN VALUE IOZL (NA) = 2.87×10^{-9}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-2 DATE CODE 8322



(1) 10ZHTYP(V0=5V) IN NA. VS DOSE
 INITIAL MEAN VALUE 10ZH (NA) = ****X10⁻¹

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-4 DATE CODE 8322

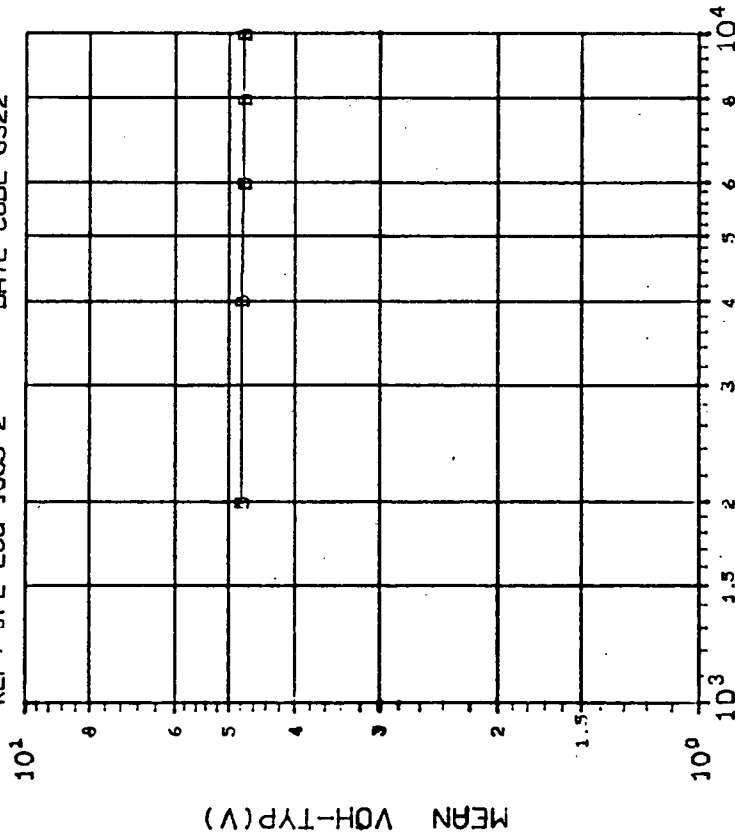


(1) 10ZHTYP(V0=5V) IN NA. VS DOSE
 INITIAL MEAN VALUE 10ZH (NA) = ****X10⁻¹

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 15 | 20 | 25 | 50 |
| A | 1.134 | 5.156 | 13.16 | 2133. |

INITIAL MEAN VALUE 10ZH (NA) = ****X10⁻¹

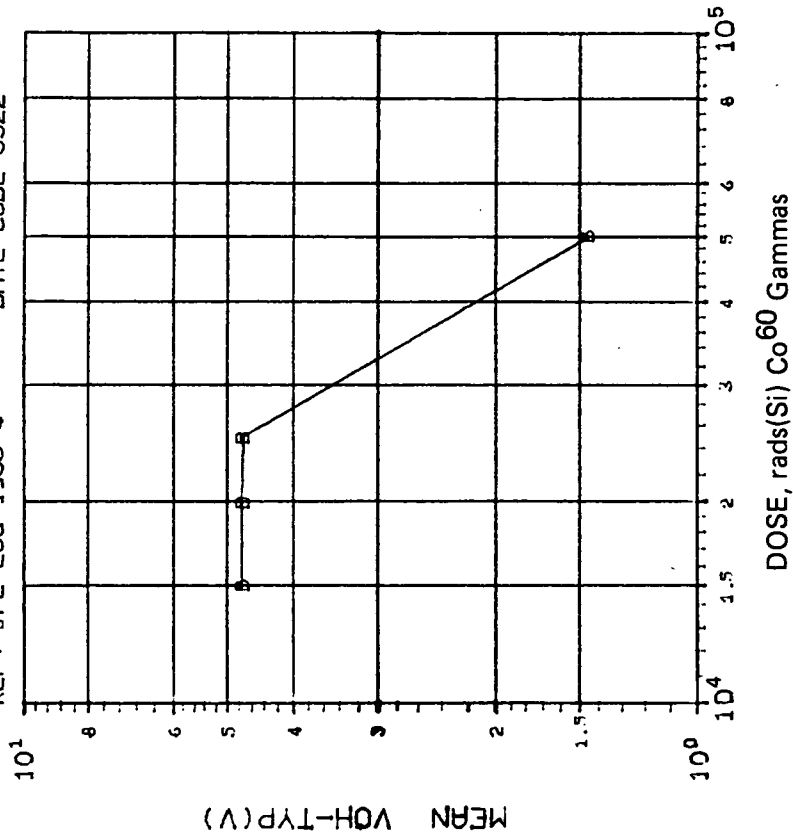
DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-2 DATE CODE 8322



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 2 |
| | 4 |
| | 6 |
| | 10 |
| | .0069 .0062 .0017 .0107 .0076 |

INITIAL MEAN VALUE VOH-TYP(V) = 4.80×10^{-9}

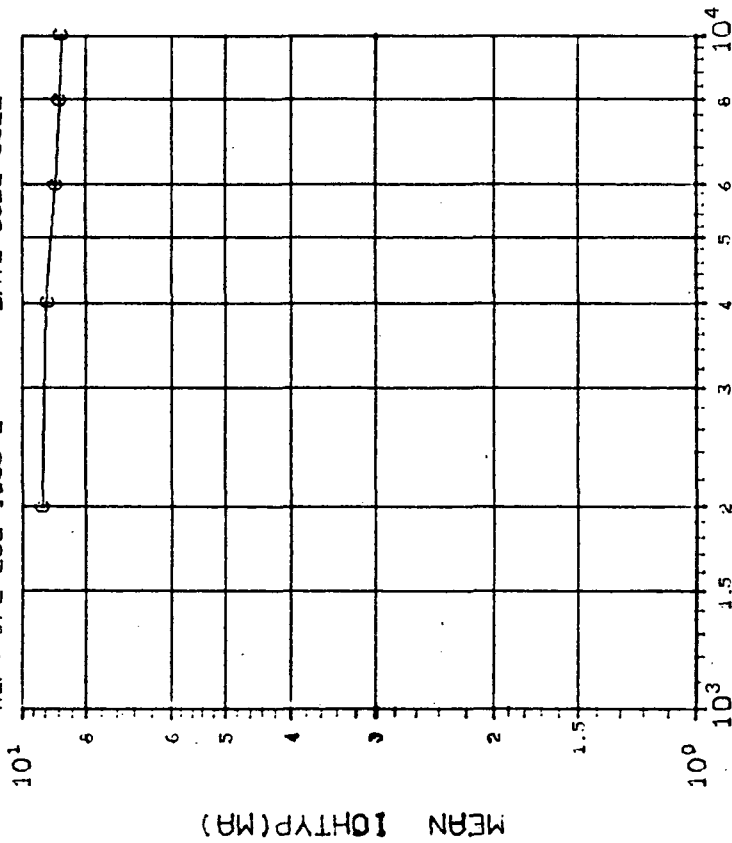
DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-4 DATE CODE 8322



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 15 |
| | 20 |
| | 25 |
| | 50 |
| | .0061 .0053 .0056 2.617 |

INITIAL MEAN VALUE VOH-TYP(V) = 4.80×10^{-9}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADJ 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-2 DATE CODE 8322



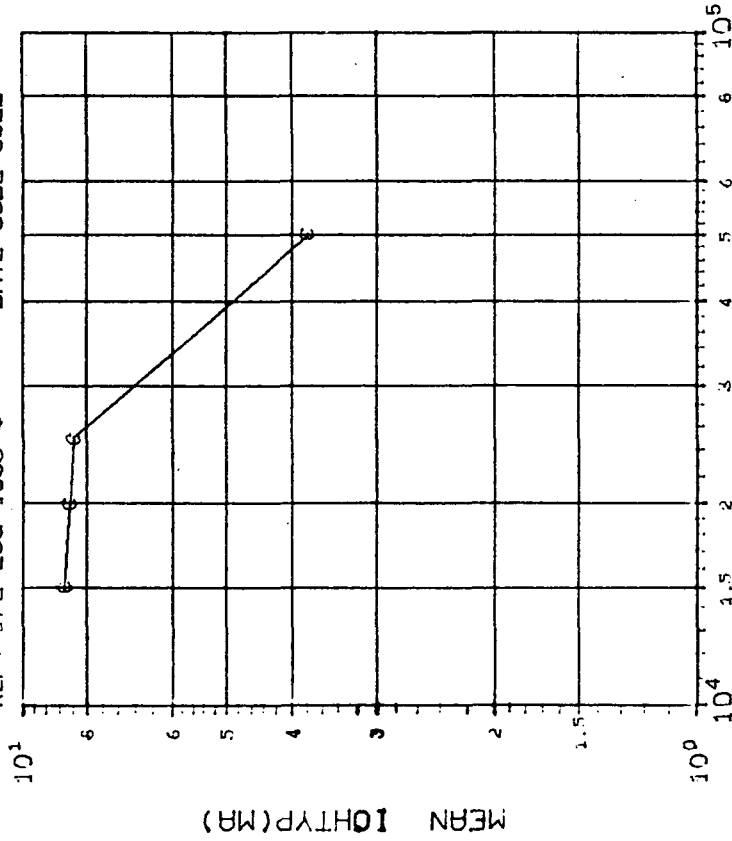
DOSE, rad(Si) Co 60 Gammas

(3)IOHTYP(V0=2.4V) IN MA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 2 | 4 |
| | .3772 | .3796 |
| | 6 | 8 |
| | .3324 | .3632 |
| | 10 | .3595 |

INITIAL MEAN VALUE IOHTYP(MA) = 9.42×10^{-9}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
MFG: ADJ 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-4 DATE CODE 8322



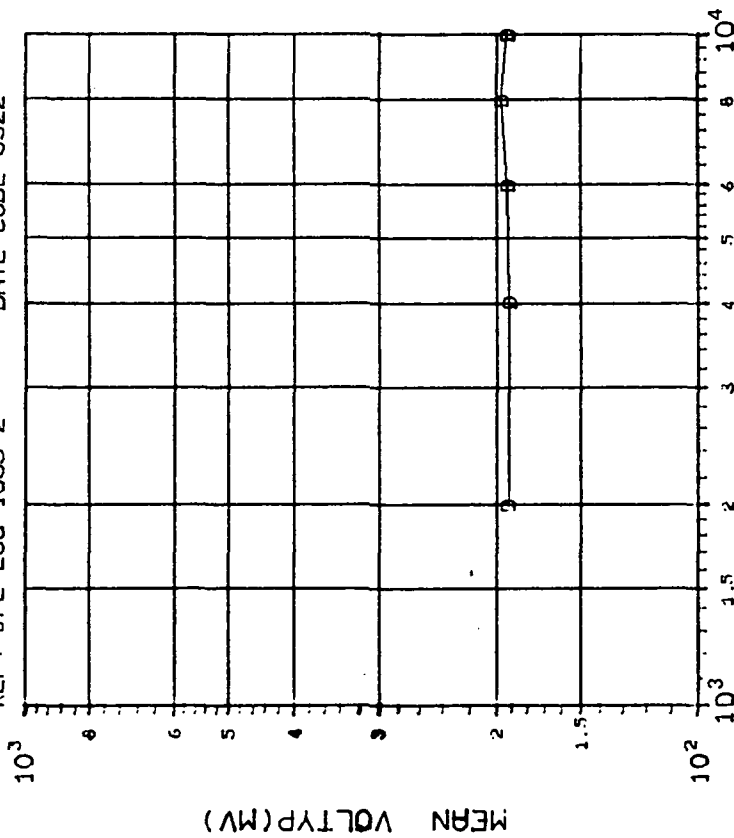
DOSE, rad(Si) Co 60 Gammas

(3)IOHTYP(V0=2.4V) IN MA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 15 | 20 |
| | .3570 | .3395 |
| | 25 | 50 |
| | .3206 | .3206 |
| | 10.67 | |

INITIAL MEAN VALUE IOHTYP(MA) = 9.42×10^{-9}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-2 DATE CODE 8322



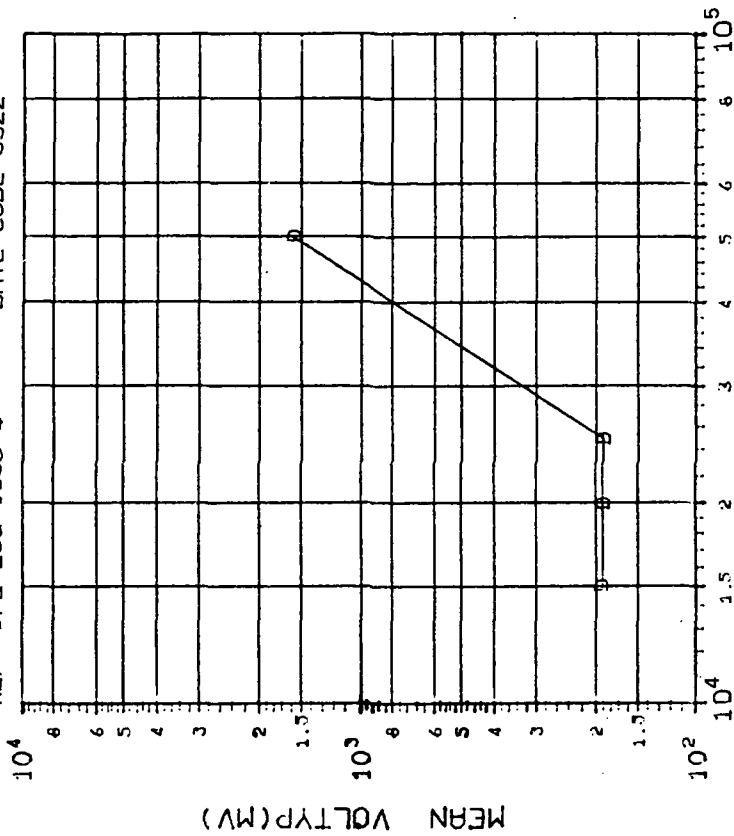
DOSE, rads(Si) Co 60 Gammas

(4) VOLTYP (10L=4MA) IN MV. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| D | 2 | 4 |
| | 4.285 | 4.551 |
| | 4.244 | 2.433 |
| | 4.446 | |

INITIAL MEAN VALUE VOLTYP(MV) = 1.95×10^{12}

DEVICE TYPE: QDSP-1016 16X16 BIT MULTIPLIER
 MFG: ADI 3 DEVICES TEST DATE 06-29-84
 REF: JPL LOG 1065-4 DATE CODE 8322



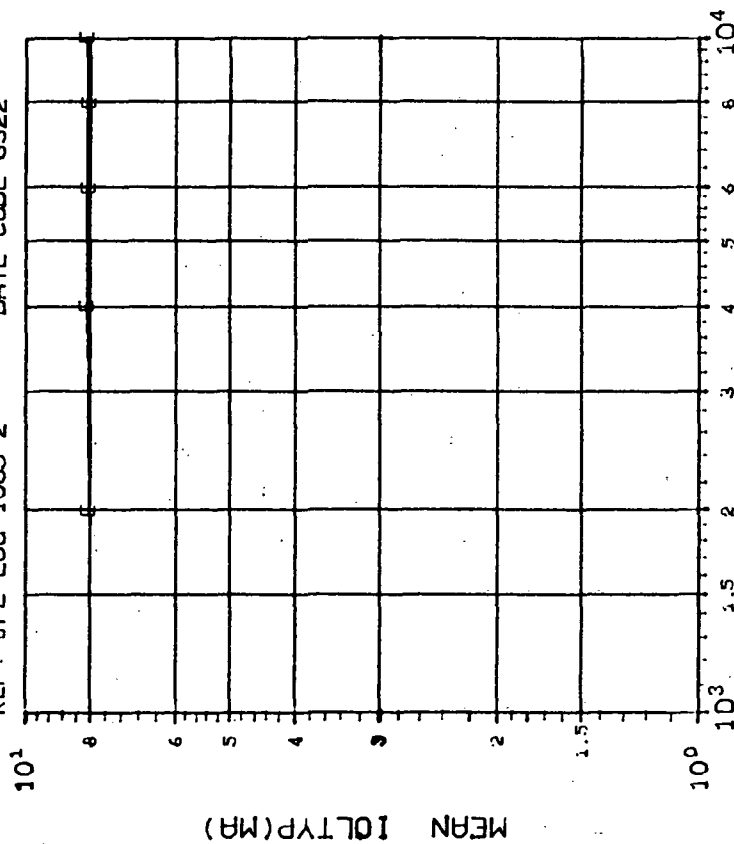
DOSE, rads(Si) Co 60 Gammas

(4) VOLTYP (10L=4MA) IN MV. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| D | 15 | 20 |
| | 4.606 | 4.757 |
| | 4.668 | 1214 |

INITIAL MEAN VALUE VOLTYP(MV) = 1.95×10^{12}

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-2 DATE CODE 8322



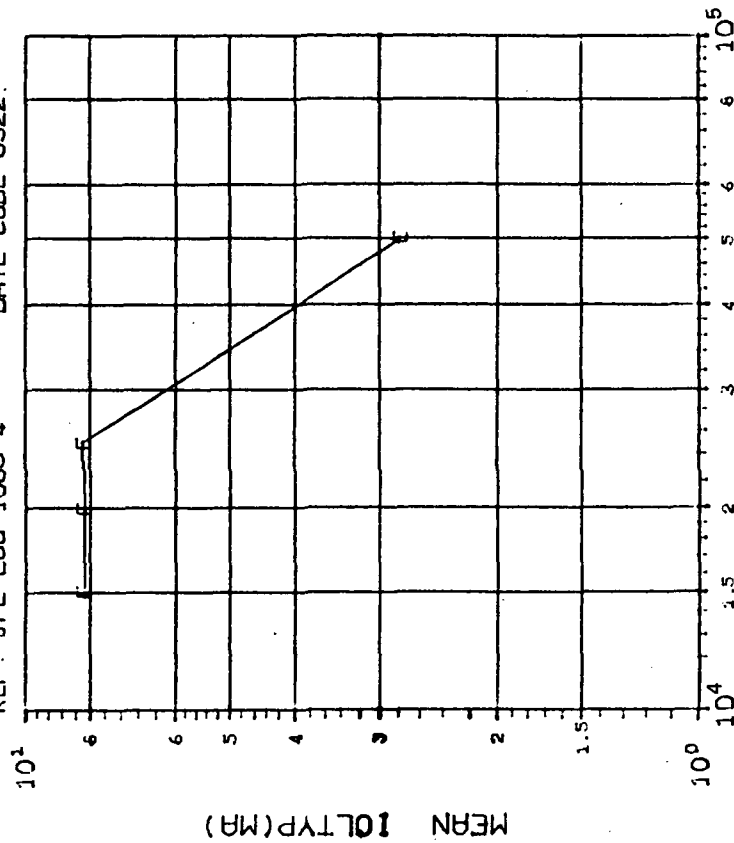
DOSE, rads(Si) Co 60 Gammas

(5) IOL TYP (V0=0.4V) IN MA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | |
|-------------------------------------|--------------------|-------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | | |
| | 2 | 4 | 6 | 8 | 10 |
| E | .1759 | .1879 | .1836 | .1822 | .1678 |

INITIAL MEAN VALUE IOL TYP(MA) = 8.01×10^{10}

DEVICE TYPE: ADSP-1016 16X16 BIT MULTIPLIER
MFG: ADI 3 DEVICES TEST DATE 06-29-84
REF: JPL LOG 1065-4 DATE CODE 8322



DOSE, rads(Si) Co 60 Gammas

(5) IOL TYP (V0=0.4V) IN MA. VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|---------------------|-------|-------|-------|
| CURVE | DOSE, kilorads (Si) | | | |
| | 15 | 20 | 25 | 30 |
| E | .1972 | .1995 | .1985 | 4.649 |

INITIAL MEAN VALUE IOL TYP(MA) = 8.01×10^{10}

DEVICE TYPE: ADSP-1016A CMOS 16 x 16 Bit
Multiplier
MFG: ADI 5 Devices
REF: JPL LOG 1109

TEST DATE: 10-23-84
DATE CODE: 8435
SOURCE: Co⁶⁰, 1.25 MeV γ

The ADSP-1016A is the latest version of the 16x16 bit CMOS Multiplier which is manufactured by Analog Devices, Inc. (ADI). This device is a pin-for-pin replacement for the older model ADSP-1016.

The following changes have been made on the newly designed ADSP-1016A:

1. Geometry Shrink (x3) to 1.5 micron
2. Thinner Oxides
3. Lowered processing temperatures
4. Titanium - Tungsten layer under the metalization
5. Process changes
6. Positive Photo-resist
7. Faster by 3 times
8. ICC is 30% higher

A total of five samples, log 1109, of the ADSP-1016A (date code 8435) were radiation tested at BREL on October 23, 1984. The devices were packaged in 64 pin DIP's. The test procedure was RTR368A using Co⁶⁰ (1.25 MeV gamma rays). The radiation levels were 6, 10, 15, 20, 25 and 50 krad(Si).

All measured parameters were within manufacturer's specification to 25 krad(Si) except for IDD-1 which exceeds specification at 15 krad(Si) and IDD-2 which exceeds specification at 25 krad(Si). Both IDD parameters are about four times harder than the previously tested ADSP-1016.

| <u>Parameter Exceeding Spec</u> | <u>ADSP-1016 d/c 8317/8322</u> | <u>ADSP-1016A d/c 8435</u> |
|---------------------------------|------------------------------------|--------------------------------|
| IDD-1 | 4 krad(Si) | 15 krad(Si) |
| IDD-2 | 6 krad(Si) | 25 krad(Si) |

At 50 krad(Si) all devices failed catastrophically.

DEVICE TYPE: ADSP-1016A CMOS 16 x 16 Bit

TEST DATE: 10-23-84

Multiplier

DATE CODE: 8435

MFG: ADI 5 Devices

SOURCE: Co⁶⁰, 1.25 MeV γ

REF: JPL LOG 1109

(continued)

These devices are rated at 18 krad(Si) for total dose applications. Because of process changes, it is recommended that the flight lot be radiation tested to verify the hardness of the flight devices. Also, these devices have 40 storage elements within the circuit which may be Single Event Upset (SEU) sensitive. Therefore, it is recommended that an SEU evaluation be conducted, and if an upset or latchup would cause a problem with your system, an SEU test should then be conducted.

DEVICE TYPE: AM6108 8 Bit A/D Converter
 MFG: AMD 6 Devices
 REF: JPL LOG 0969

TEST DATE: 3-3-83
 DATE CODE: 8237DM
 SOURCE: Dynamition, 2.5 MeV e⁻

RADIATION BIAS CONDITION: $V_{CC} = 5$ volts
 $V_{DD} = -5$ volts

RESULTS: Worst-Case Parameter Values,
 External Reference Voltage to V_{REFIN}

| Total Dose, krad(Si) | I_{IL} , nA (maximum) | I_{IH} , μ A (maximum) | V_{OL} , mV (maximum) | I_{OL} , mA (minimum) | V_{OH} , V (minimum) | I_{OH} , mA (minimum) |
|----------------------------|-------------------------------|------------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|
| Initial | 1.0 | 8.88 | 350 | 13.2 | 2.90 | -13.6 |
| 30 | 1.0 | 9.34 | 352 | 12.9 | 3.10 | -13.7 |
| 75 | 1.0 | 9.77 | 354 | 12.6 | 3.00 | -13.6 |
| 150 | 1.0 | 10.40 | 356 | 12.4 | 2.85 | -13.5 |
| 300 | 1.0 | 11.05 | 358 | 12.0 | 2.04 | Fail |
| 600 | 1.0 | 7.40 | 347 | 13.6 | Fail | Fail |

| Total Dose, krad(Si) | I_{SC} , mA (minimum) | I_{OZH} , μ A (maximum) | I_{OZL} , nA (maximum) | V_{REF} , V (Δ maximum) | V_{RF-REG} , mV (Δ maximum) | OFFSET mV (Δ maximum) |
|----------------------------|-------------------------------|-------------------------------------|--------------------------------|---|---|-------------------------------------|
| Initial | -34.7 | 5.27 | 1.00 | --- | --- | --- |
| 30 | -34.6 | 5.08 | 1.00 | -2.85 | 204 | -20 |
| 75 | -34.5 | 5.28 | 1.00 | -5.12 | 169 | -37 |
| 150 | -34.4 | 5.21 | 1.00 | -8.13 | 150 | -58 |
| 300 | -34.2 | 5.28 | 1.45 | -12.51 | 135 | -95 |
| 600 | -34.0 | 3.94 | 4.65 | -13.87 | 103 | Fail |

DEVICE TYPE: AM6108 8 Bit A/D Converter

TEST DATE: 3-3-83

MFG: AMD 6 Devices

DATE CODE: 8237DM

REF: JPL LOG 0969

SOURCE: Dynamition, 2.5 MeV e⁻

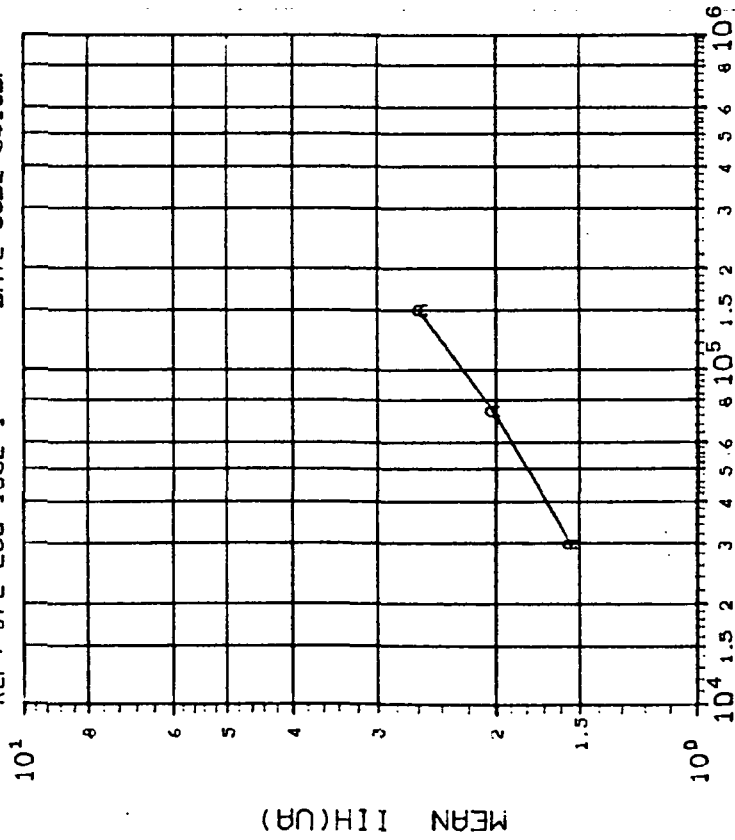
(continued)

| Total Dose krad(Si) | OFF-ERR, LSB (Δmaximum) | NON-LIN, LSB (Δmaximum) | GAIN, LSB (Δmaximum) | I _{CC} , mA (maximum) | I _{EE} , mA (maximum) |
|---------------------------|-------------------------------|-------------------------------|----------------------------|--------------------------------------|--------------------------------------|
| Initial | ---- | ---- | ---- | 42.2 | -68.1 |
| 30 | -0.5 | -0.2 | 0.3 | 41.3 | -66.5 |
| 75 | -0.7 | -0.2 | 0.9 | 40.9 | -65.4 |
| 150 | 1.0 | -0.2 | 1.6 | 39.7 | -63.8 |
| 300 | 2.0 | -0.4 | 2.6 | 38.9 | -61.7 |
| 600 | Fail | Fail | Fail | 33.0 | -53.3 |

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-1 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(1111H (V1H=2.0V) IN UA: VS DOSE

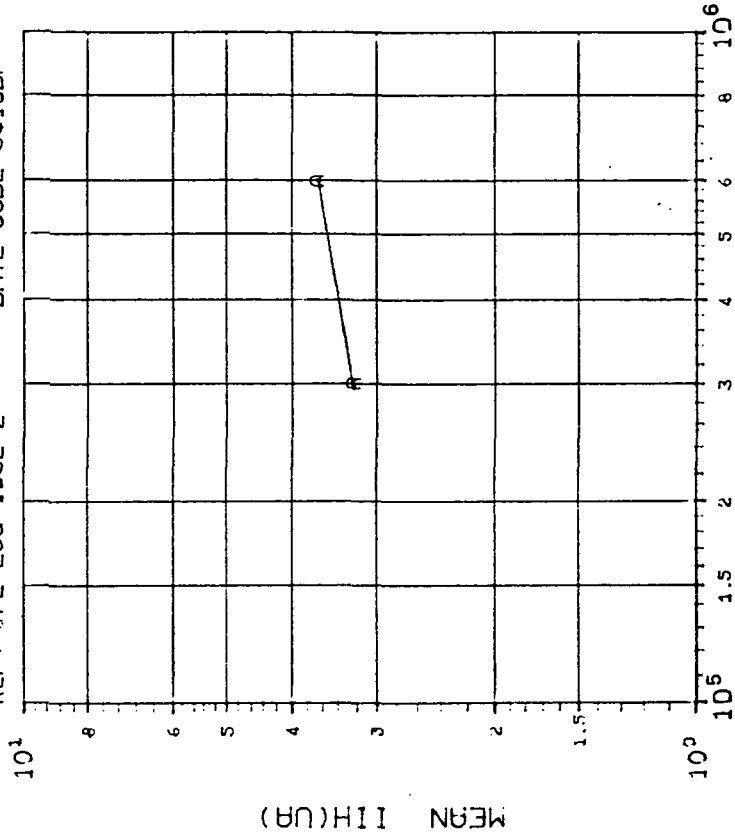
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| A | .2440 | .3967 .5237 |

INITIAL MEAN VALUE I1H(UA) = $1.14 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-2 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(1111H (V1H=2.0V) IN UA: VS DOSE

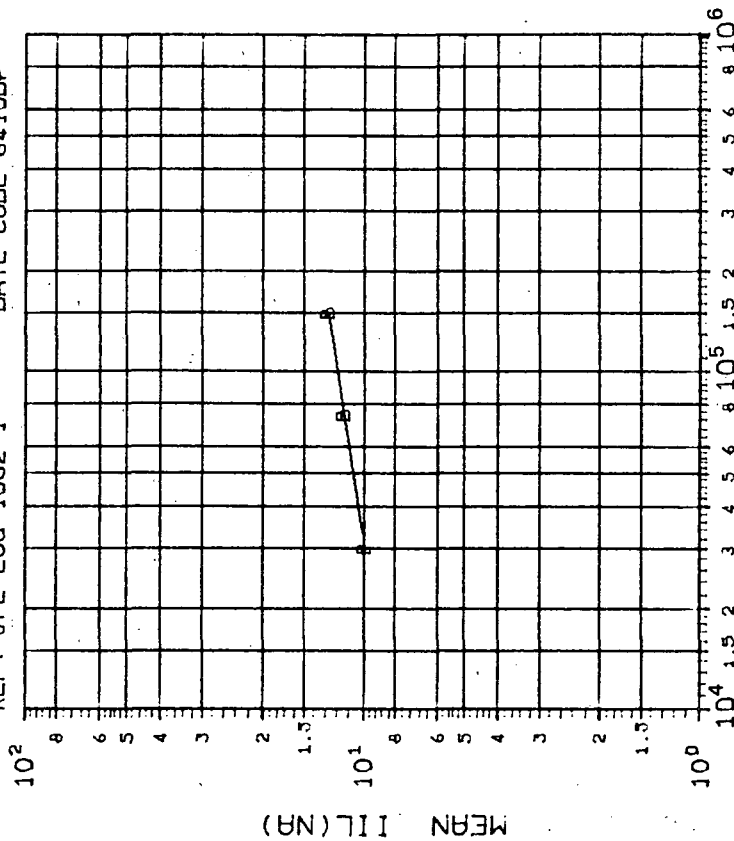
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------|
| CURVE | DOSE, kilorads(Si) | |
| | 300 | 600 1000 |
| A | .5713 | .5472 **** |

INITIAL MEAN VALUE I1H(UA) = $1.14 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-1 DATE CODE 8410DP



MEAN IIL (NA)

DOSE, rads(Si) 2.5 MeV electrons

(2) IIL (VIL=0.4V) IN NA: VS DOSE

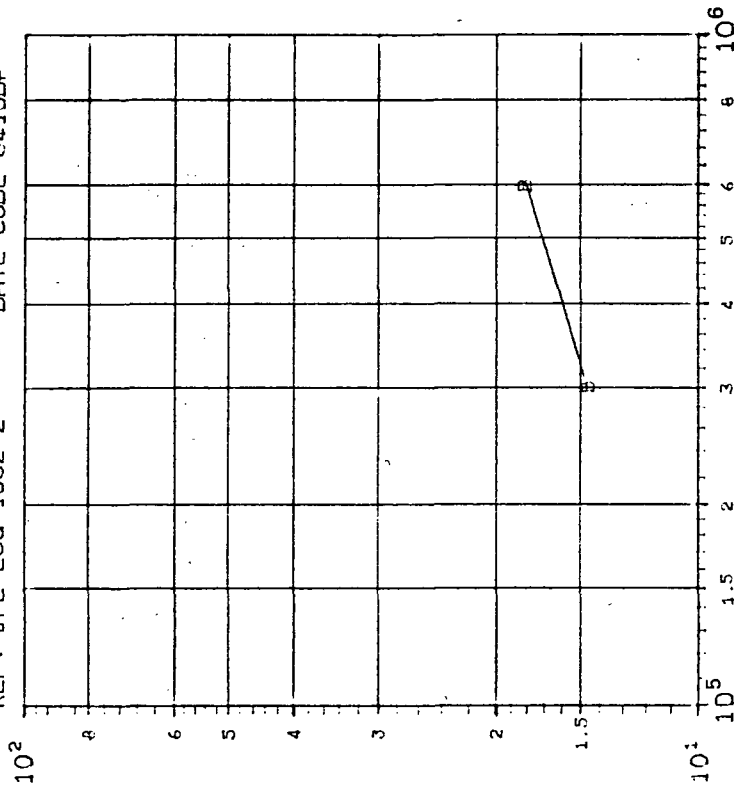
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 30 75 150 |
| | 6.365 7.365 8.317 |

INITIAL MEAN VALUE IIL(NA) = $5.90 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-2 DATE CODE 8410DP



MEAN IIL (NA)

DOSE, rads(Si) 2.5 MeV electrons

(2) IIL (VIL=0.4V) IN NA: VS DOSE

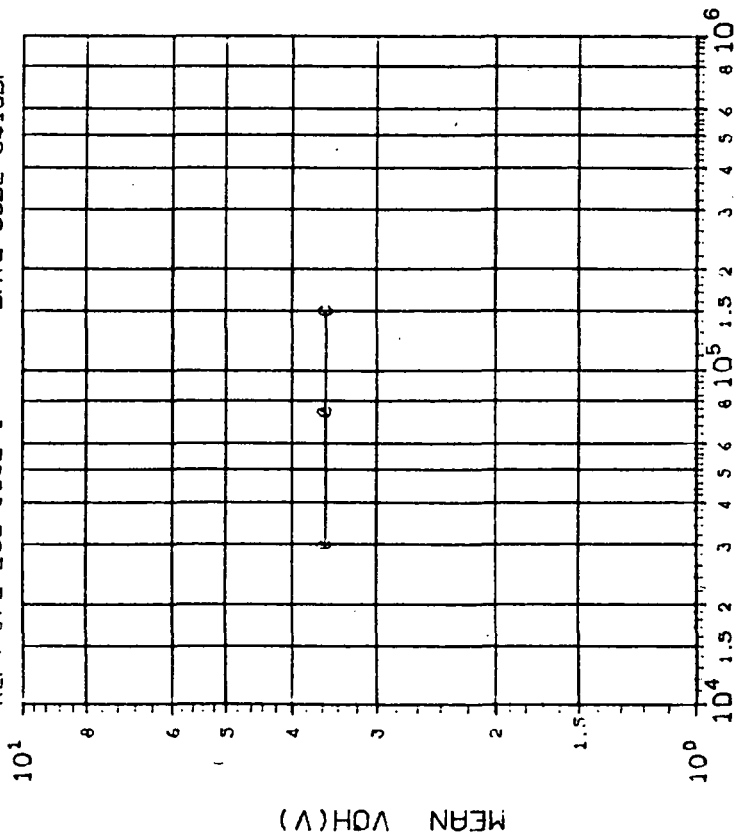
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 300 600 1000 |
| | 9.022 10.13 **** |

INITIAL MEAN VALUE IIL(NA) = $5.90 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-1 DATE CODE 8410DP



DOSE, kilorads(Si) 2.5 MeV electrons

(3)VOH (10H=-400) IN V : VS DOSE

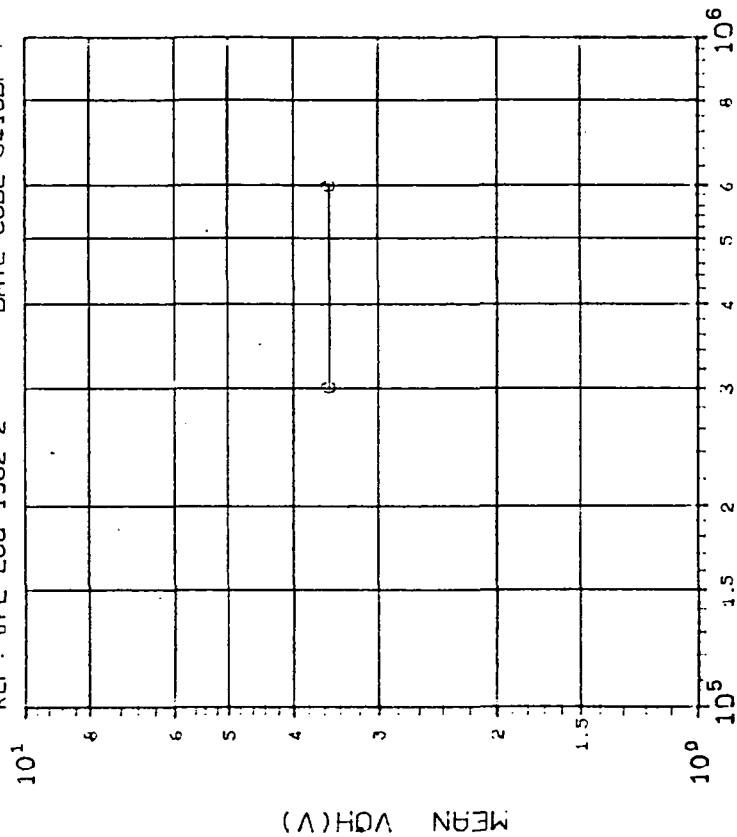
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 30 75 150 |
| | .0140 .0164 .0157 |

INITIAL MEAN VALUE VOH(V) = 3.56X10+0

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-2 DATE CODE 8410DP



DOSE, kilorads(Si) 2.5 MeV electrons

(3)VOH (10H=-400) IN V : VS DOSE

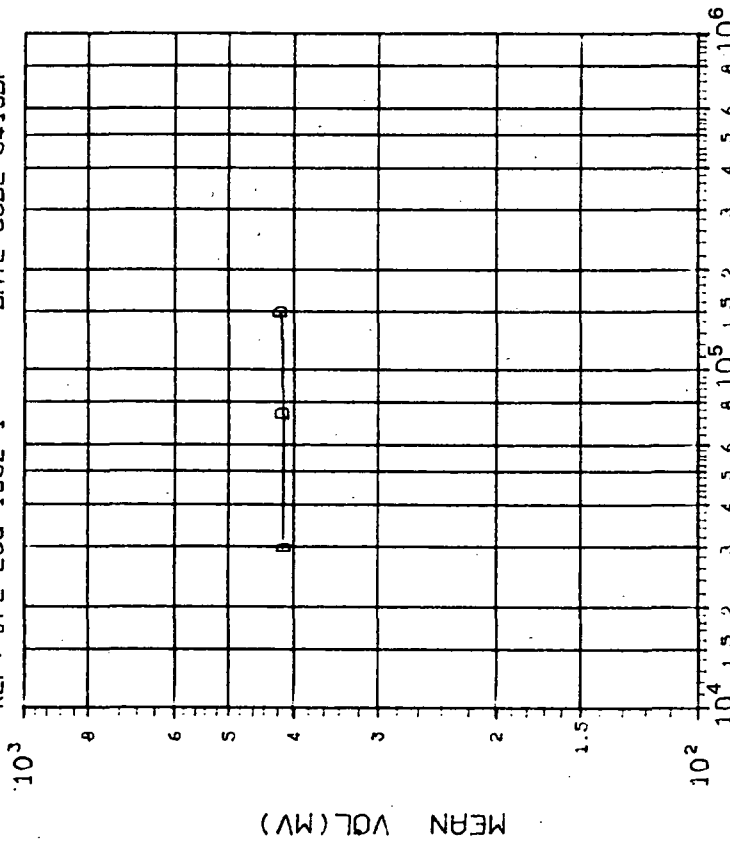
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 300 600 1000 |
| | .0152 .0156 **** |

INITIAL MEAN VALUE VOH(V) = 3.56X10+0

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-1 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(4) VOL (10L=8MA) IN MV: VS DOSE

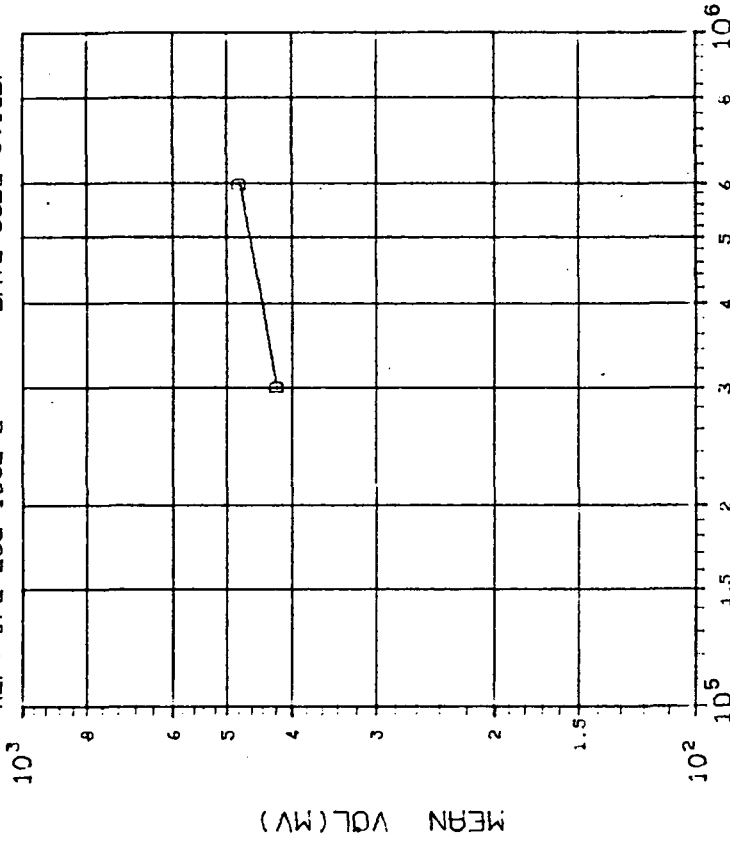
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 30 75 150 |
| D | 6.723 6.028 5.152 |

INITIAL MEAN VALUE VOL (MV) = 4.10×10^{12}

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-2 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(4) VOL (10L=8MA) IN MV: VS DOSE

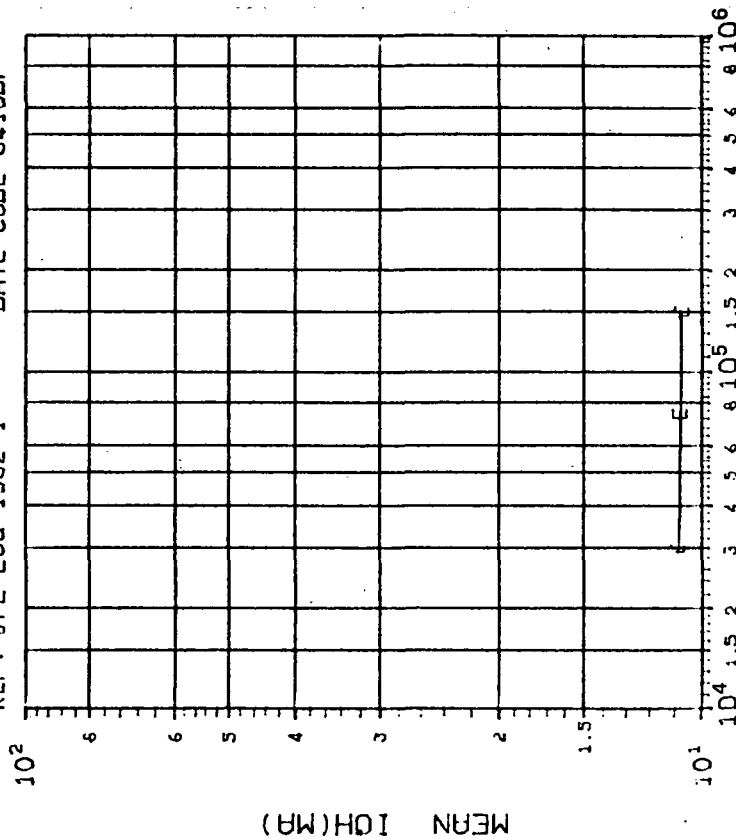
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 300 600 1000 |
| D | 5.286 27.56 **** |

INITIAL MEAN VALUE VOL (MV) = 4.10×10^{12}

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-1 DATE CODE 8410DP



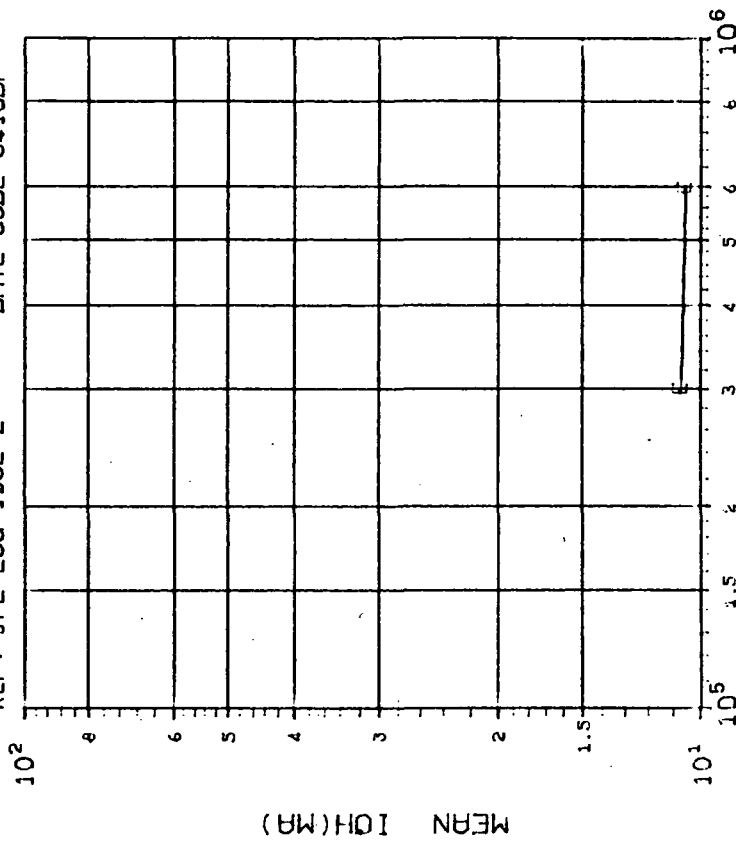
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 30 75 150 .3601 .3611 .3417 |

INITIAL MEAN VALUE IOH(MA) = $1.08 \times 10^{+1}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-2 DATE CODE 8410DP



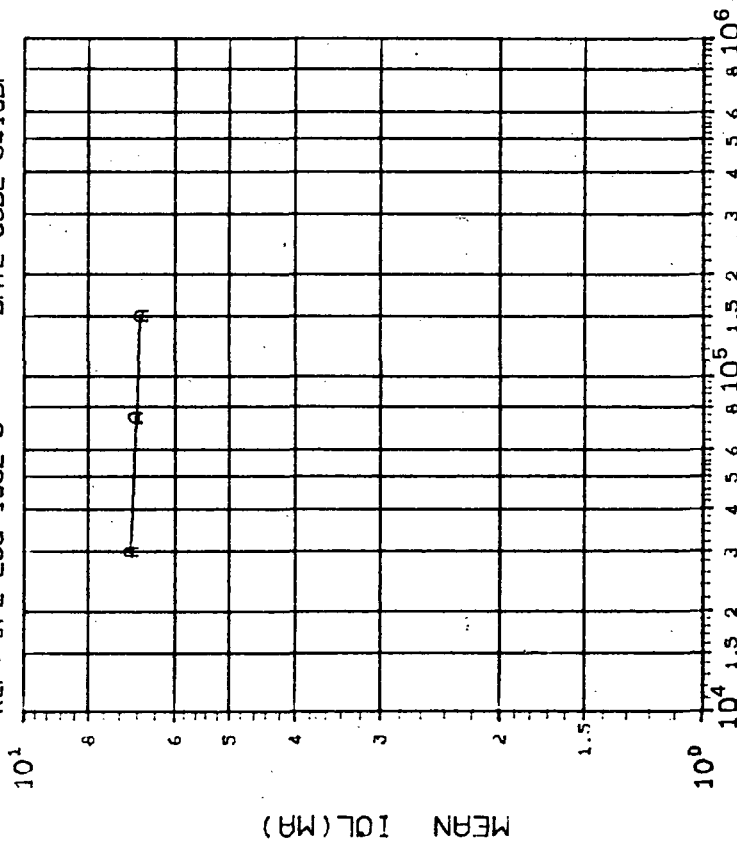
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|---------------------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 300 600 1000 .3474 .2881 *** |

INITIAL MEAN VALUE IOH(MA) = $1.08 \times 10^{+1}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

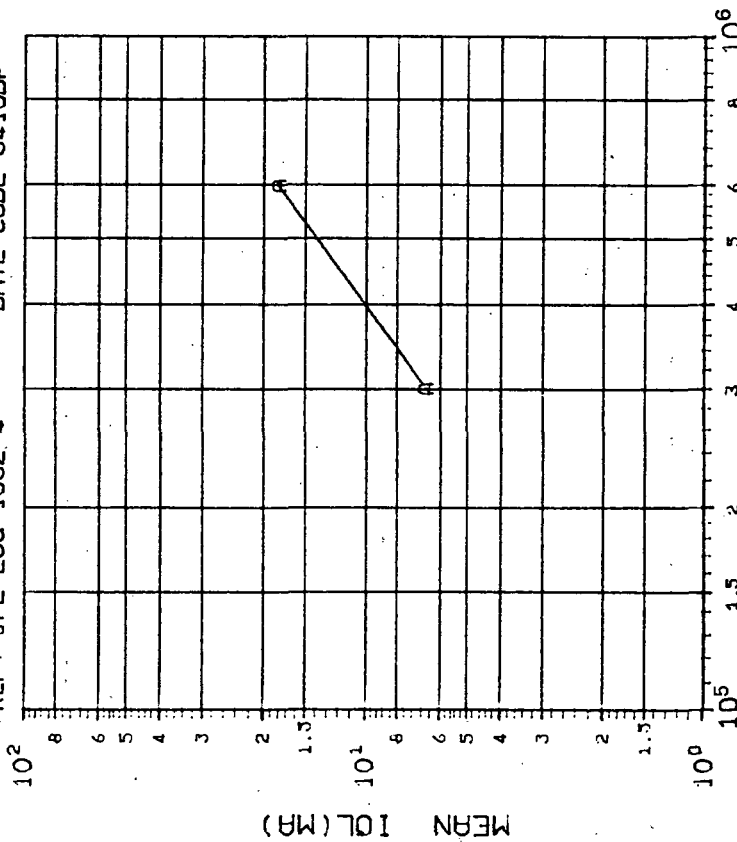
REF: JPL LOG 1062-3 DATE CODE 8410DP



DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

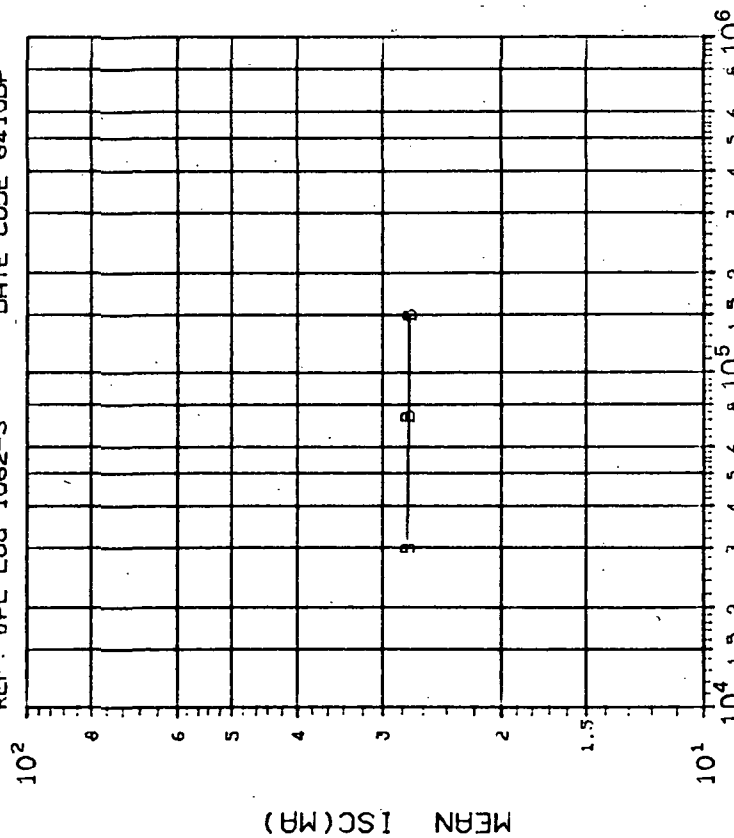
REF: JPL LOG 1062-4 DATE CODE 8410DP



DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-3 DATE CODE 8410DP



DOSE, rad(Si) 2.5 MeV electrons

(2)ISC (V0=0V) IN MA: VS DOSE

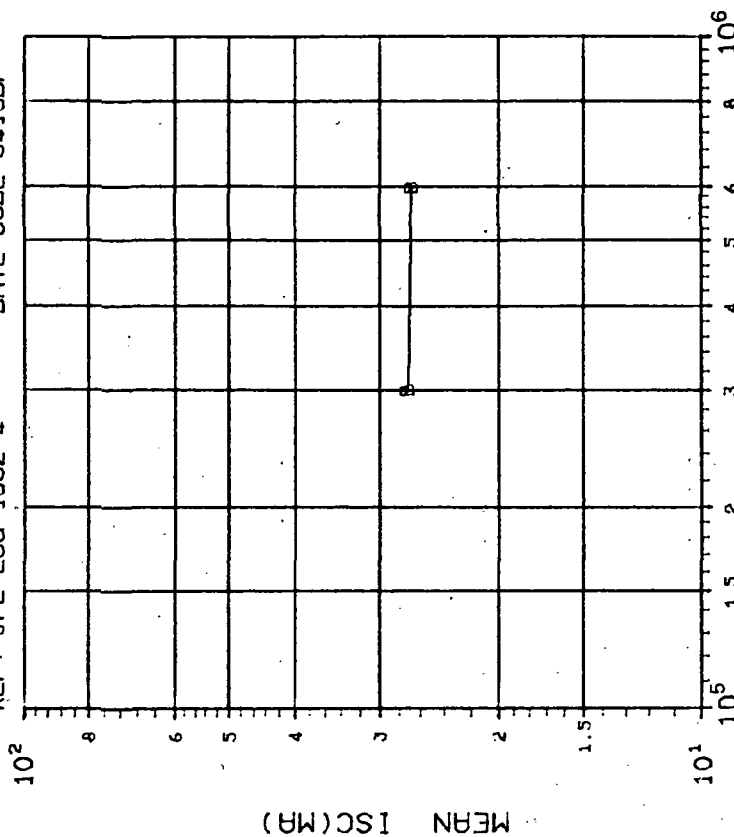
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 30 75 150 |
| | .9803 .9378 .9076 |

INITIAL MEAN VALUE ISC(MA) = 2.77×10^{-11}

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-4 DATE CODE 8410DP



DOSE, rad(Si) 2.5 MeV electrons

(2)ISC (V0=0V) IN MA: VS DOSE

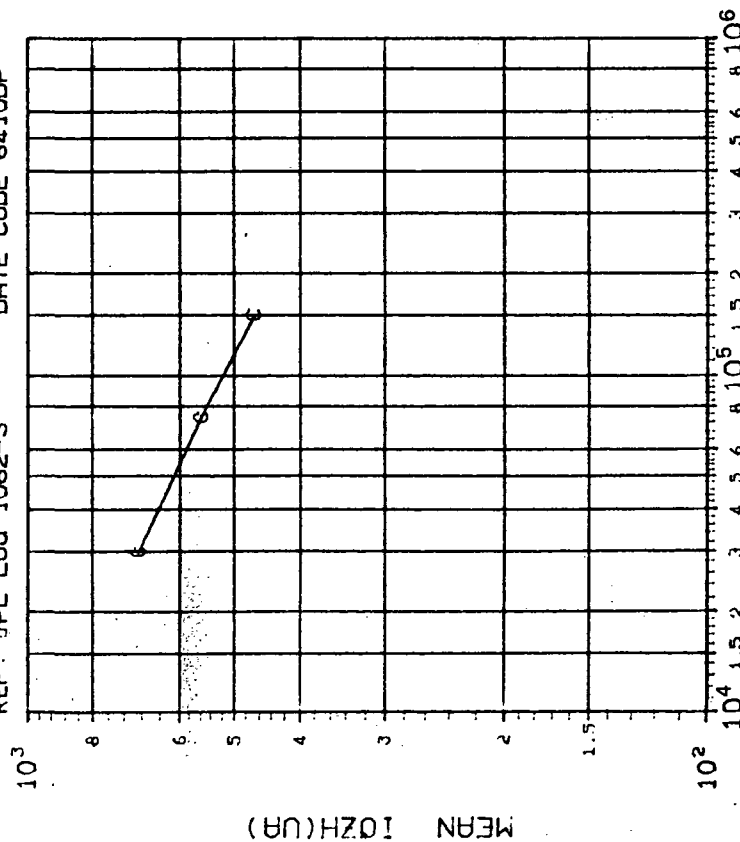
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 300 600 1000 |
| | .9131 .7301 **** |

INITIAL MEAN VALUE ISC(MA) = 2.77×10^{-11}

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-3 DATE CODE 8410DP



MEAN 10ZH(UA)

DOSE, rads(Si) 2.5 MeV electrons

(3)10ZH (V0=5.0V) IN UA: VS DOSE

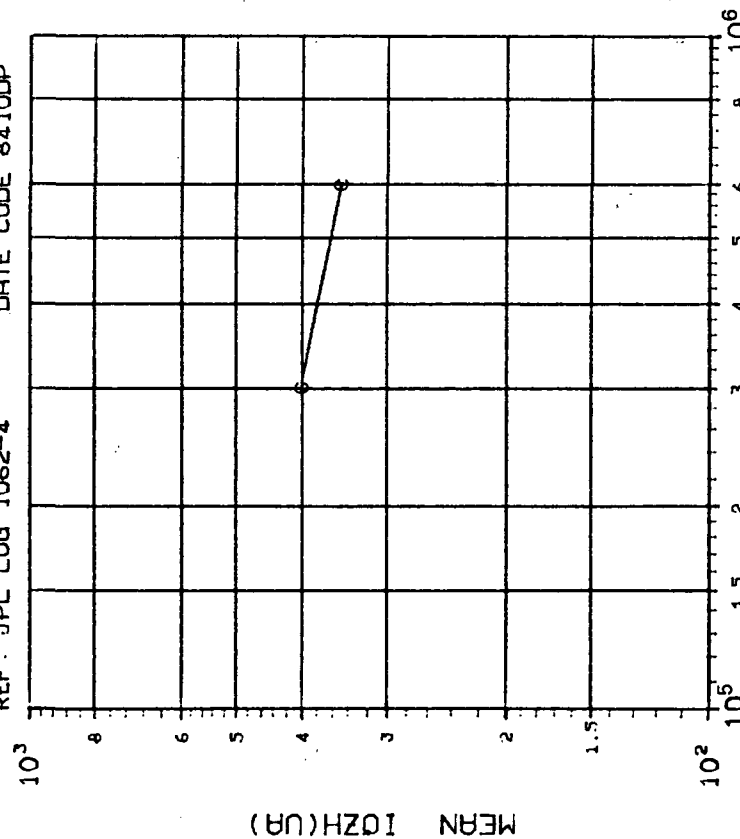
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| C | 50.38 | 44.38 40.74 |

INITIAL MEAN VALUE 10ZH(UA) = $8.32 \times 10^{+2}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-4 DATE CODE 8410DP



MEAN 10ZH(UA)

DOSE, rads(Si) 2.5 MeV electrons

(3)10ZH (V0=5.0V) IN UA: VS DOSE

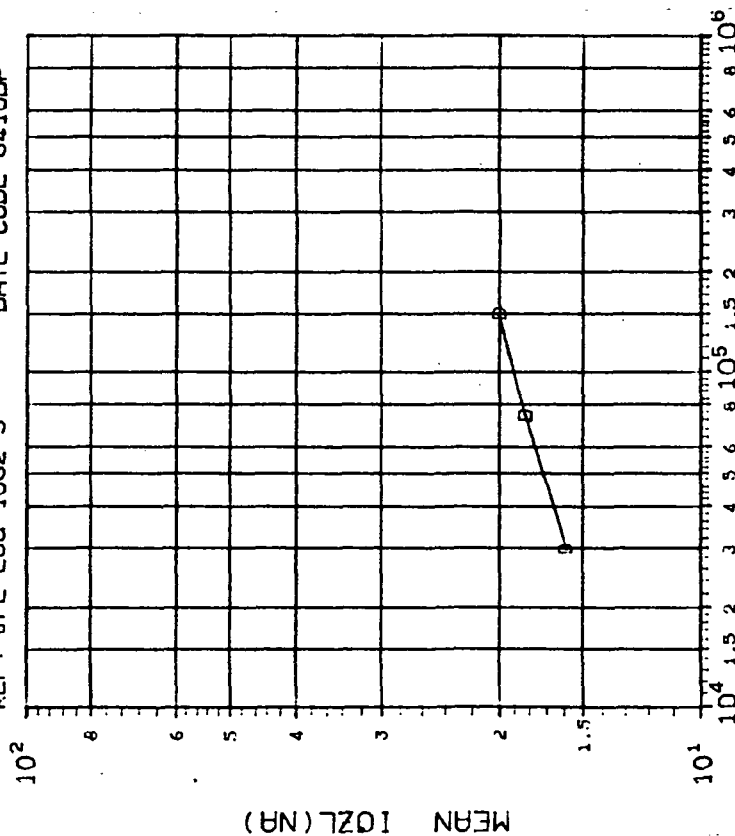
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------|
| CURVE | DOSE, kilorads(Si) | |
| | 300 | 600 1000 |
| C | 37.39 | 39.50 **** |

INITIAL MEAN VALUE 10ZH(UA) = $8.32 \times 10^{+2}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-3 DATE CODE 8410DP



MEAN IOZL (NA)

DOSE, rads(Si) 2.5 MeV electrons

(4)IOZL (VO=0V) IN NA: VS DOSE

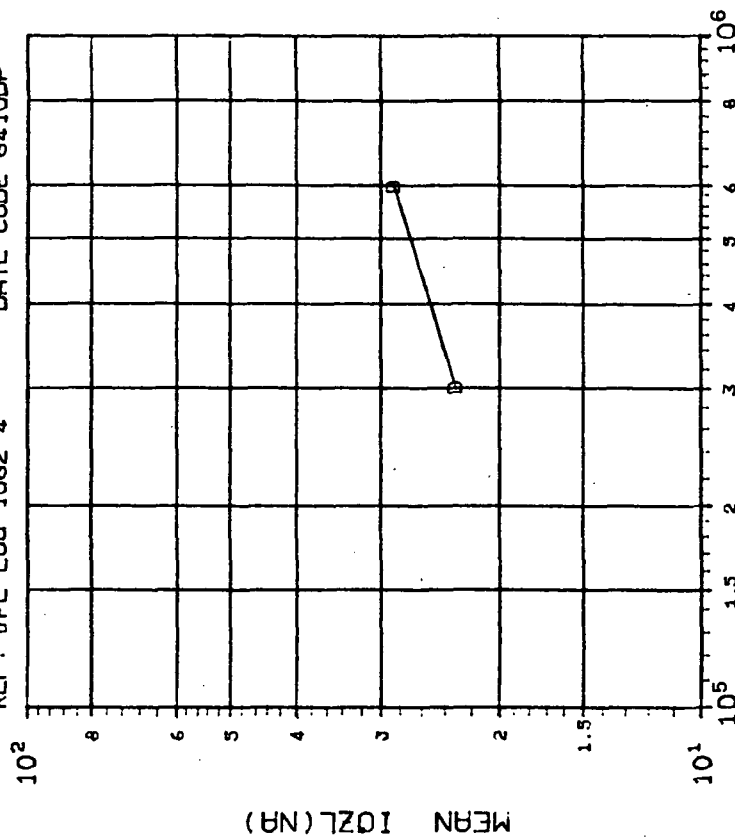
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 30 |
| | 75 |
| | 150 |
| 10.17 11.75 12.69 | |

INITIAL MEAN VALUE IOZL(NA) = $9.82 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-4 DATE CODE 8410DP



MEAN IOZL (NA)

DOSE, rads(Si) 2.5 MeV electrons

(4)IOZL (VO=0V) IN NA: VS DOSE

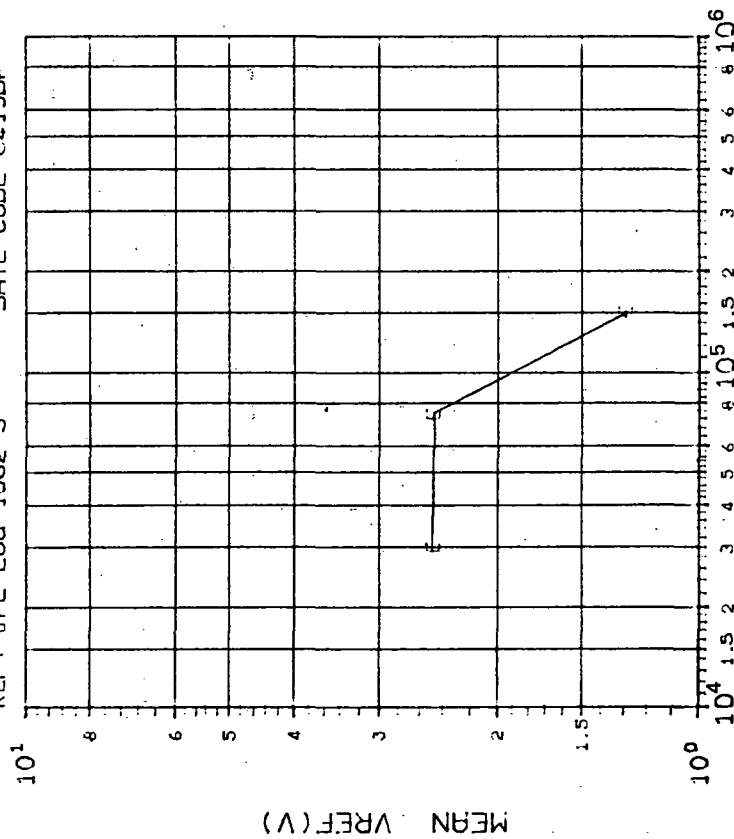
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 300 |
| | 600 |
| | 1000 |
| 14.30 15.77 **** | |

INITIAL MEAN VALUE IOZL(NA) = $9.82 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-3 DATE CODE 8410DP



DOSE, rad(Si) 2.5 MeV electrons

(5) VREF (NO LOAD) IN V : VS DOSE

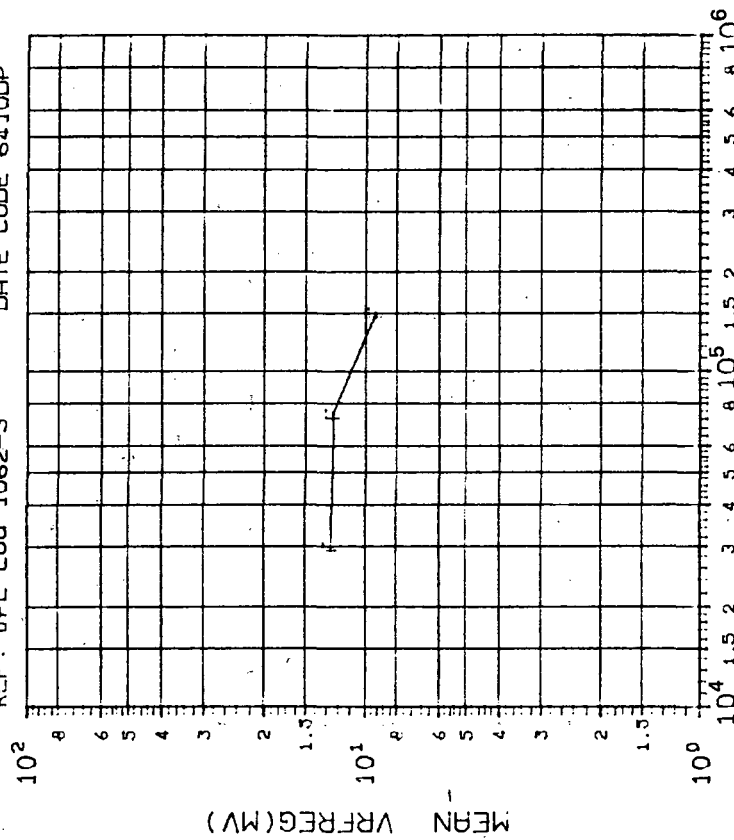
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| E | .0014 | .0022 1.316 |

INITIAL MEAN VALUE VREF(V) = 2.50X10⁰

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-3 DATE CODE 8410DP



DOSE, rad(Si) 2.5 MeV electrons

(6) VREF (10⁻⁵ MA) IN MV: VS DOSE

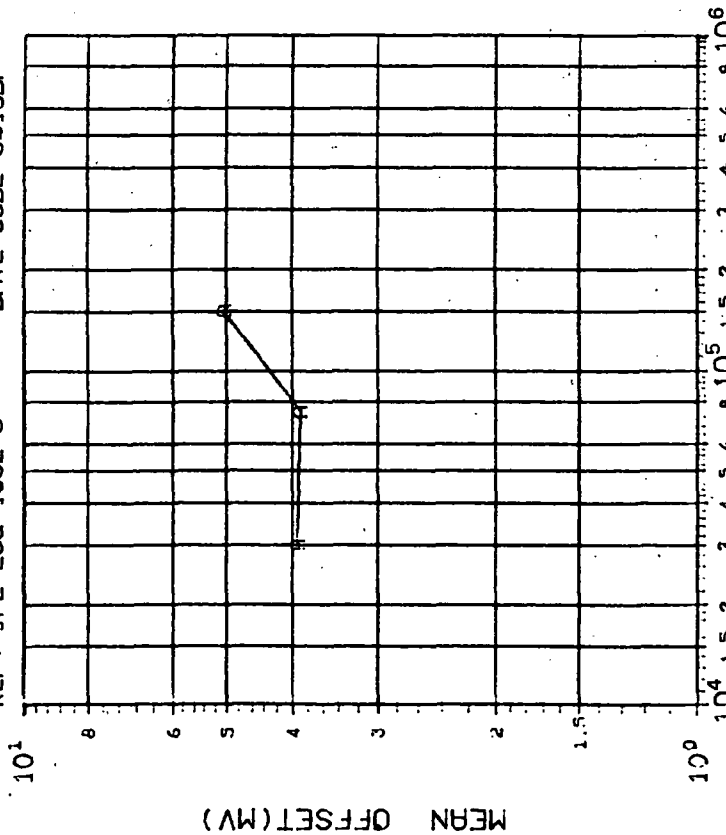
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| F | .6231 | .6933 5.947 |

INITIAL MEAN VALUE VREF(MV) = 1.24X10¹

DEVICE TYPE: QM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-S DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(1) OFFSET (VOLTS) IN MV: VS DOSE

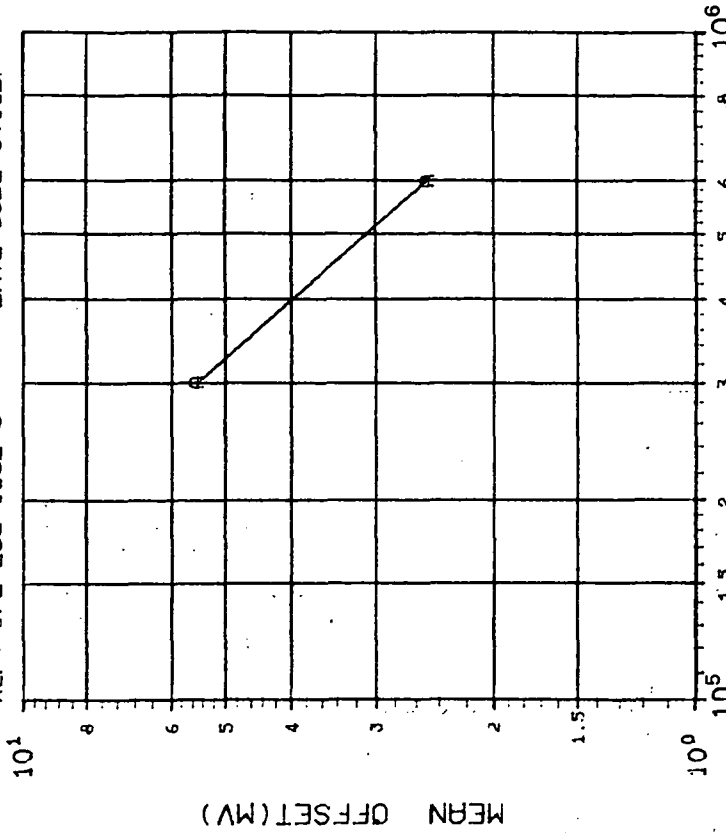
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 30 75 150 |
| | 1.076 .7687 1.145 |

INITIAL MEAN VALUE OFFSET(MV) = $3.65 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-6 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(1) OFFSET (VOLTS) IN MV: VS DOSE

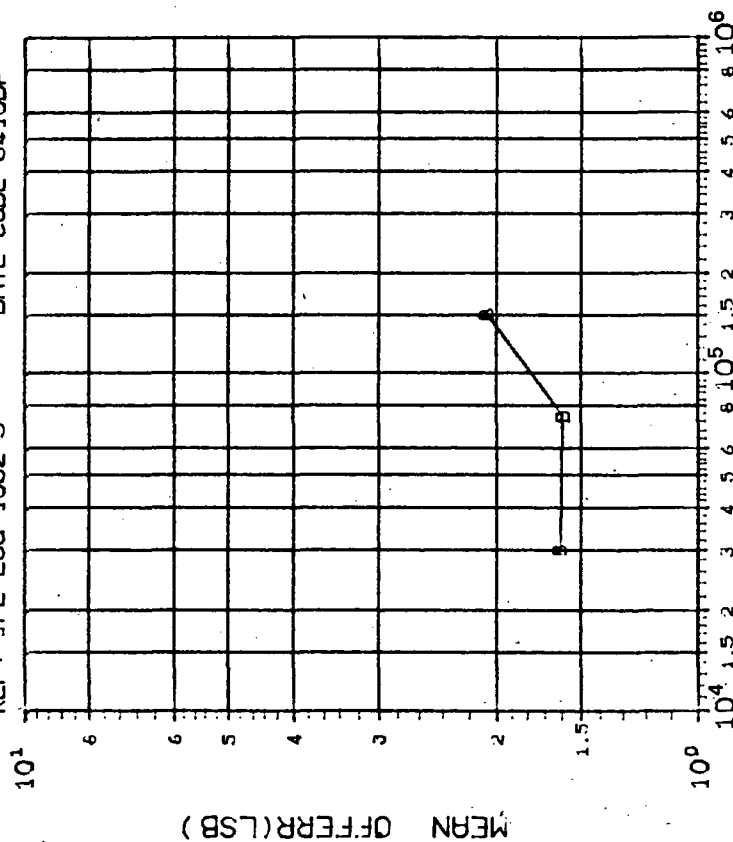
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 300 600 1000 |
| | 2.534 2.895 **** |

INITIAL MEAN VALUE OFFSET(MV) = $3.65 \times 10^{+0}$

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-5 DATE CODE 84100P



DOSE, rad(Si) 2.5 MeV electrons

(2)OFFERR (LSB) IN LSB: VS DOSE

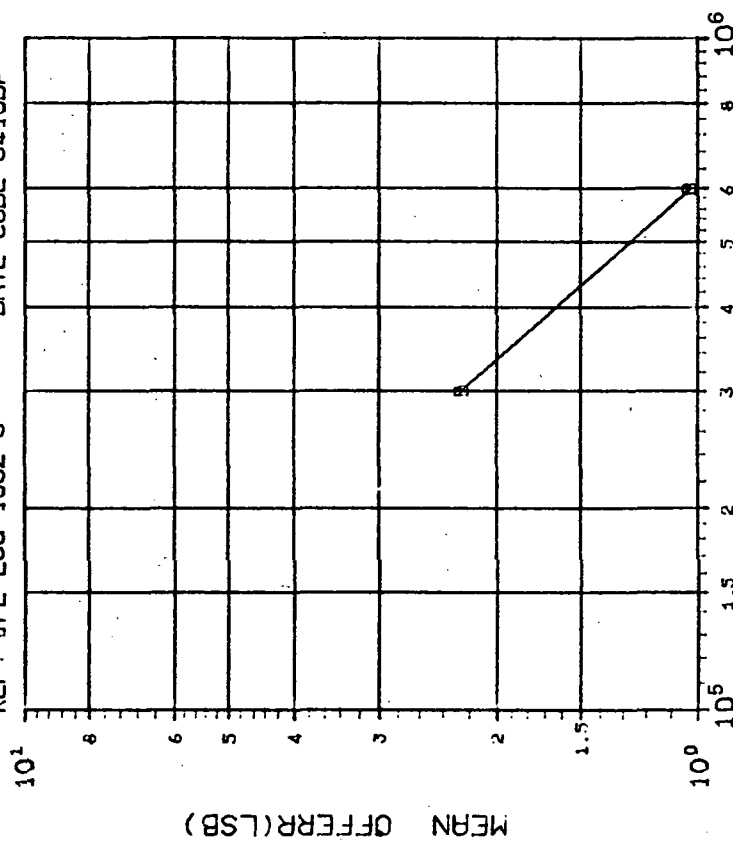
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 30 |
| | 75 |
| | 150 |
| .4406 .3149 .7143 | |

INITIAL MEAN VALUE OFFERR(LSB)= 1.50X10⁺⁰

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-6 DATE CODE 84100P



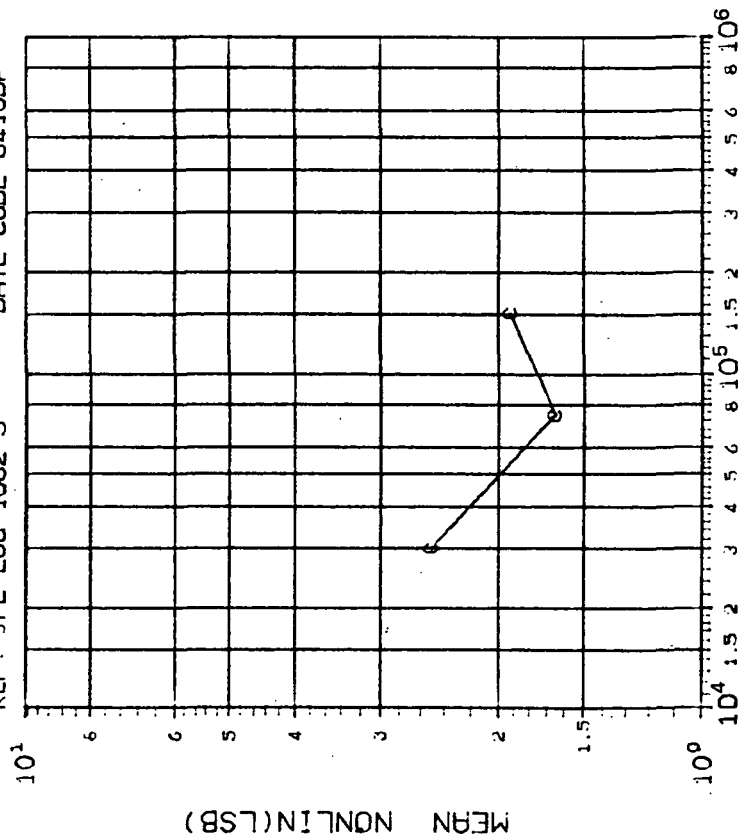
DOSE, rad(Si) 2.5 MeV electrons

(2)OFFERR (LSB) IN LSB: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 300 |
| | 600 |
| | 1000 |
| 1.038 1.186 **** | |

INITIAL MEAN VALUE OFFERR(LSB)= 1.50X10⁺⁰

DEVICE TYPE: AM6112 12BIT ADC
 MFG: QMD 6 DEVICES TEST DATE 7-20-84
 REF: JPL LOG 1062-5 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(3)NONLIN (LSB) IN LSB: VS DOSE

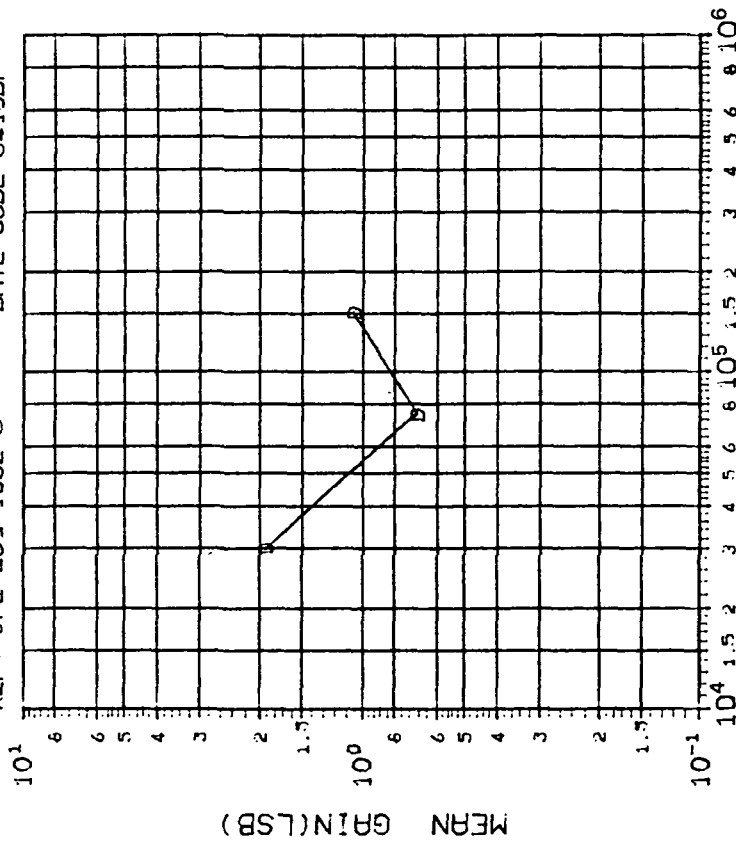
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 |
| C | .9512 | .4754 |

INITIAL MEAN VALUE NONLIN(LSB) = 1.61×10^{-4}

DEVICE TYPE: QM6112 12BIT ADC

MFG: QMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-5 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(4)GAIN (LSB) IN LSB: VS DOSE

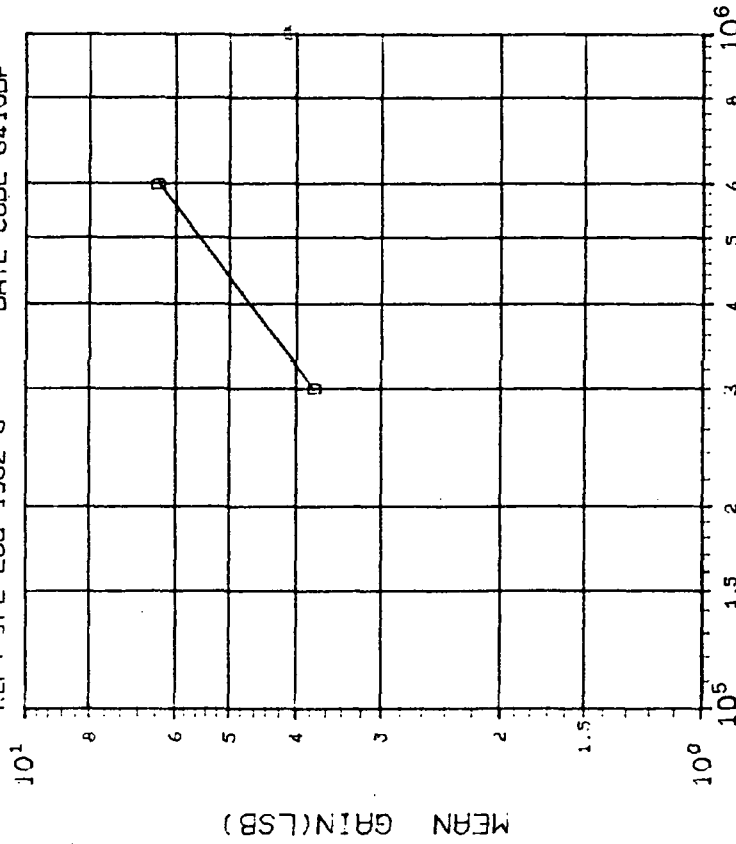
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 30 |
| | 75 |
| | 150 |
| 1.468 3.019 1.537 | |

INITIAL MEAN VALUE GAIN(LSB) = 1.57×10^{-0}

DEVICE TYPE: QM6112 12BIT ADC

MFG: QMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-6 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(4)GAIN (LSB) IN LSB: VS DOSE

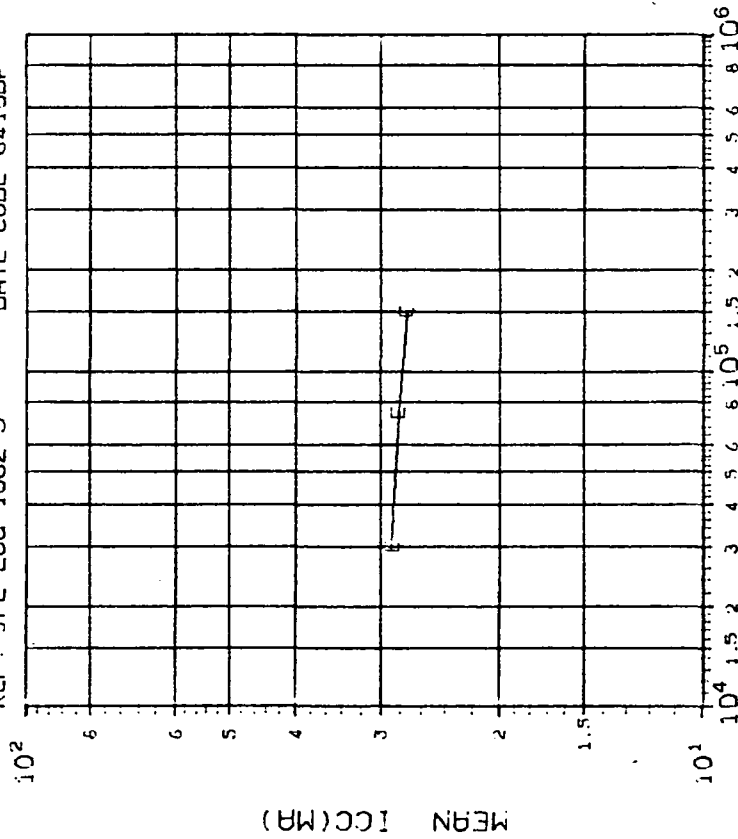
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 300 |
| | 600 |
| | 1000 |
| 4.350 7.377 **** | |

INITIAL MEAN VALUE GAIN(LSB) = 1.57×10^{-0}

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-5 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(5)ICC (VCC=5V) IN MA: VS DOSE

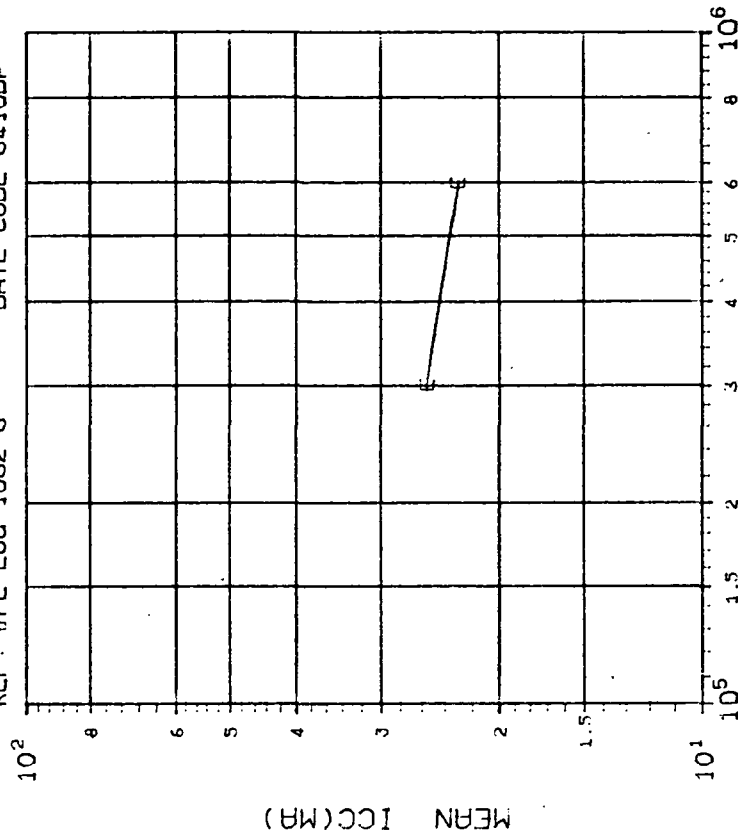
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 30 75 150 |

INITIAL MEAN VALUE ICC(MA) = 2.96X10⁻¹

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-6 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(5)ICC (VCC=5V) IN MA: VS DOSE

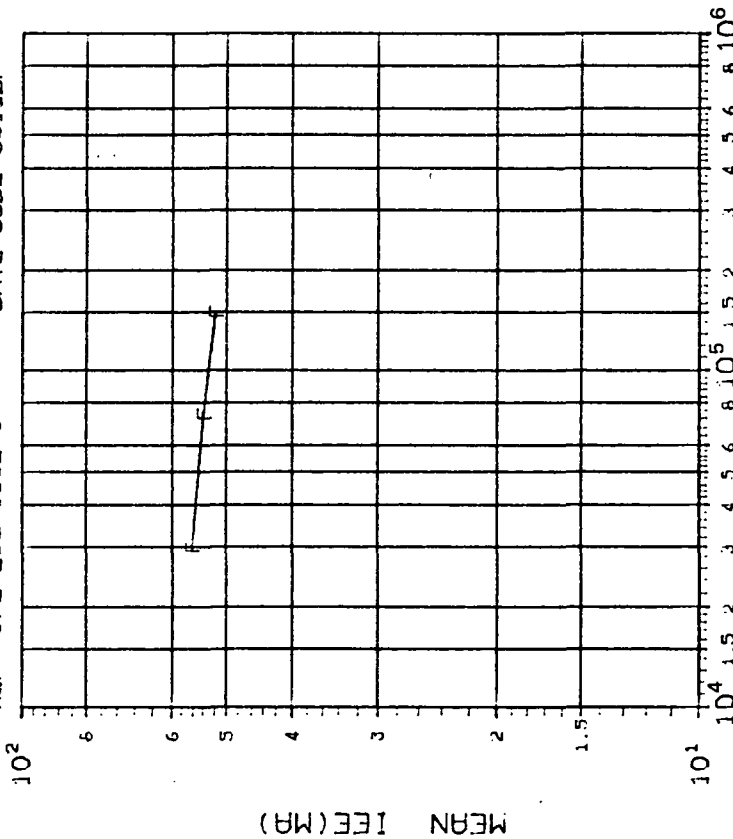
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 300 600 1000 |

INITIAL MEAN VALUE ICC(MA) = 2.96X10⁻¹

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-3 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(6)IEE (VEE=-5V) IN MA: VS DOSE

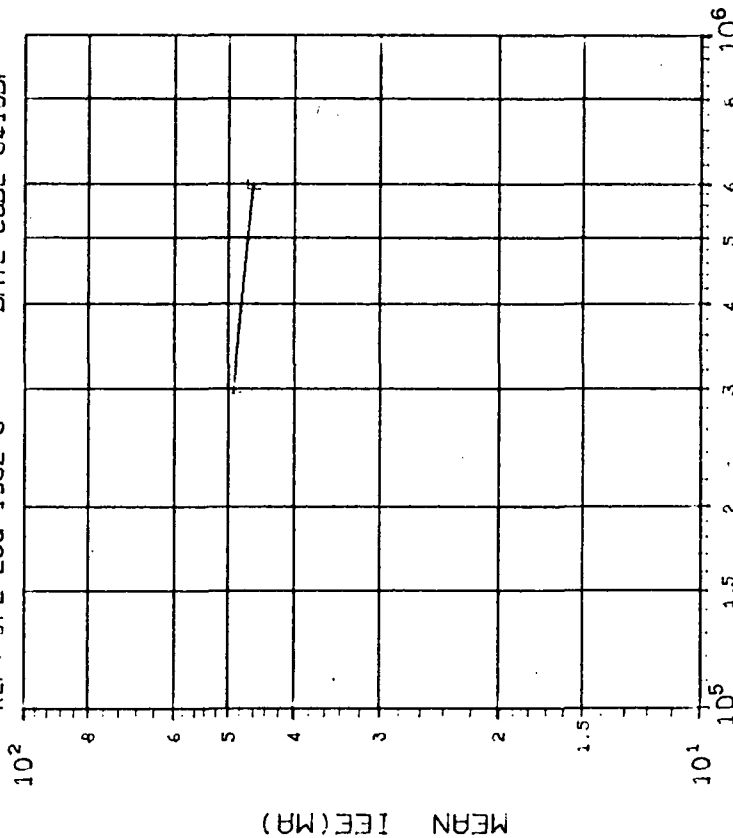
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| F | 2.524 | 2.370 2.259 |

INITIAL MEAN VALUE IEE(MA) = 5.63×10^{-11}

DEVICE TYPE: AM6112 12BIT ADC

MFG: AMD 6 DEVICES TEST DATE 7-20-84

REF: JPL LOG 1062-6 DATE CODE 8410DP



DOSE, rads(Si) 2.5 MeV electrons

(6)IEE (VEE=-5V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------|
| CURVE | DOSE, kilorads(Si) | |
| | 300 | 600 1000 |
| F | 2.190 | 2.503 **** |

INITIAL MEAN VALUE IEE(MA) = 5.63×10^{-11}

DEVICE TYPE: AM6148 8 Bit A/D Converter

TEST DATE: 7-15-82

MFG: AMD 4 Devices

DATE CODE: 8220D

REF: JPL LOG 0823

SOURCE: Dynamitron, 2.5 MeV e⁻

Four samples of the AMD AM6148, 8-bit, analog-to-digital converter (date code 8220D) were tested per RTR 342, 15 July 1982 on the Dynamitron at the Boeing Radiation Effects Lab (BREL). The total dose levels were 30, 75, 150, 300, 600 krad(Si), and 1 Mrad(Si).

Note: The AMD AM6148 is from a family of ADC's which includes the AM6108 8-bit and the AM6112 12-bit ADC's. All three devices use the same cell structures and processes. Therefore, the radiation test results from this test of the AM6148 should be similar to the test results expected from the AM6108 and AM6112 ADC's.

Test Results

The first failure was after a total dose of 600 krad(Si). Device S/N 101 failed V_{OH} and I_{OH} on data line 7. V_{REF} was degraded with a Δ of 9mV and the Gain Error increased by a factor of two. The other devices tested indicated nominal changes.

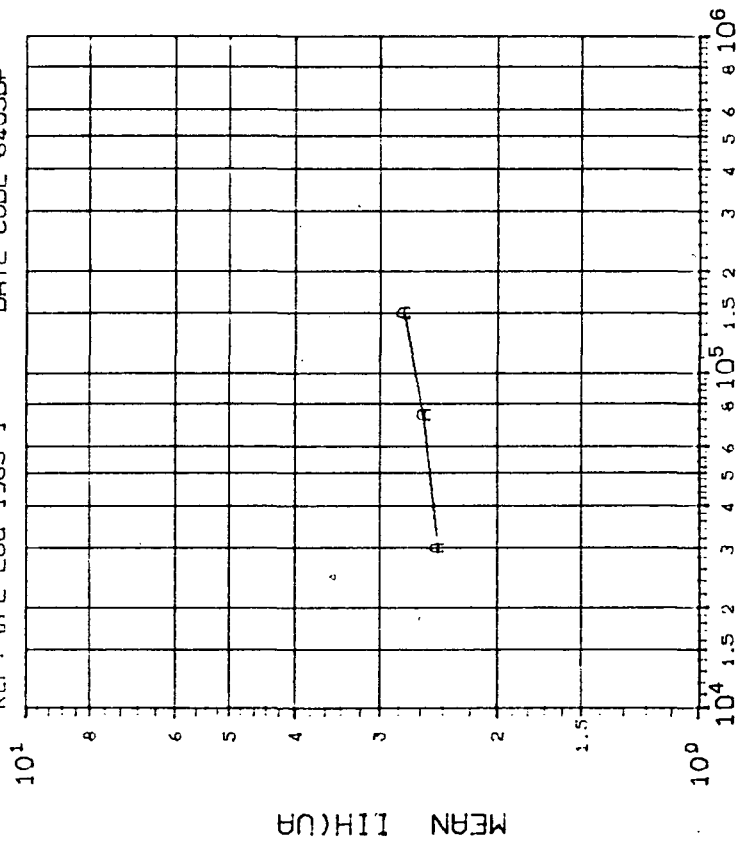
At 1 Mrad(Si) total dose devices S/N 101 and 104 failed most of the tested parameters. S/N 102 and 103 remained functional and only slightly degraded. Leakage does not seem to be a problem as typical leakage currents increased by only a factor of two, which is a very small increase.

Remarks

The overall test results indicate that these devices are useable to 300 krad(Si). Because these devices are from a very early production run, further testing will be required after the final design and processing "tweaks" are completed to establish their production lot radiation hardness. Because of their similarity to the AM6148, the AM6108 and AM6112 ADC's should be of similar hardness, but these devices need to be radiation tested to establish their individual hardness levels.

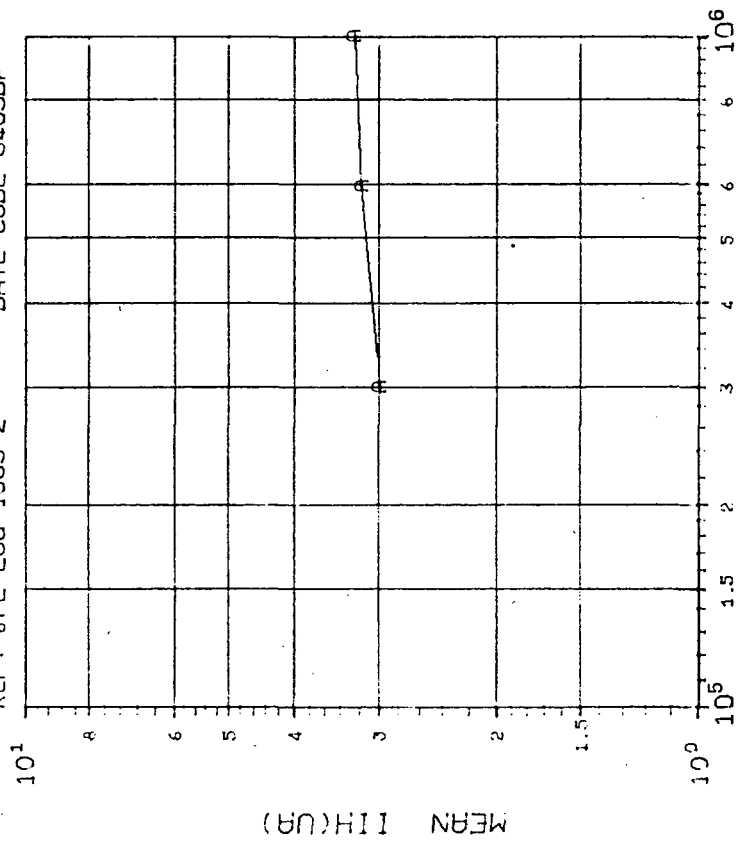
DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84
REF: JPL LOG 1063-1 DATE CODE 8405DP



DEVICE TYPE: AM6148 8BIT ADC

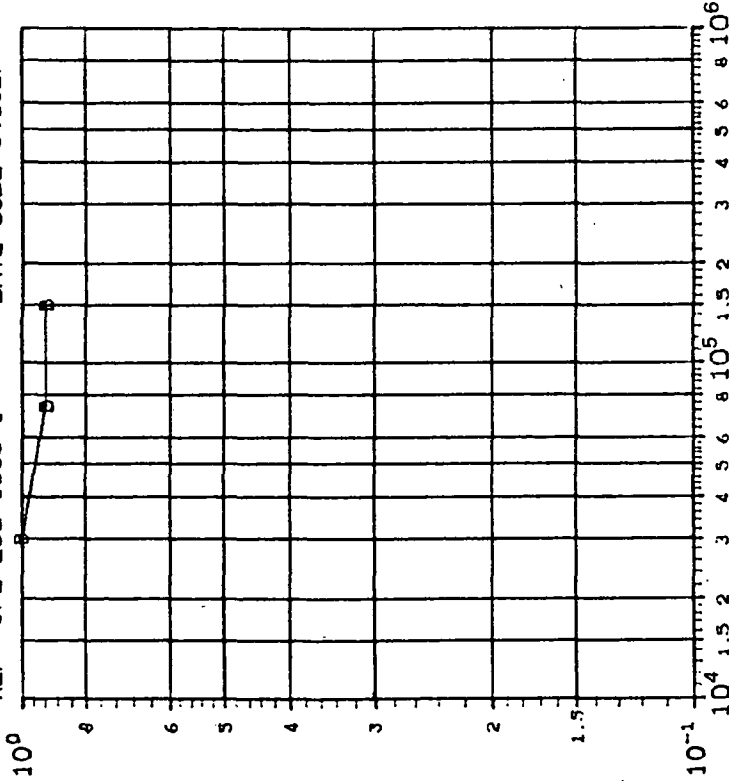
MFG: AMD 5 DEVICES TEST DATE 7-19-84
REF: JPL LOG 1063-2 DATE CODE 8405DP



DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-1 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

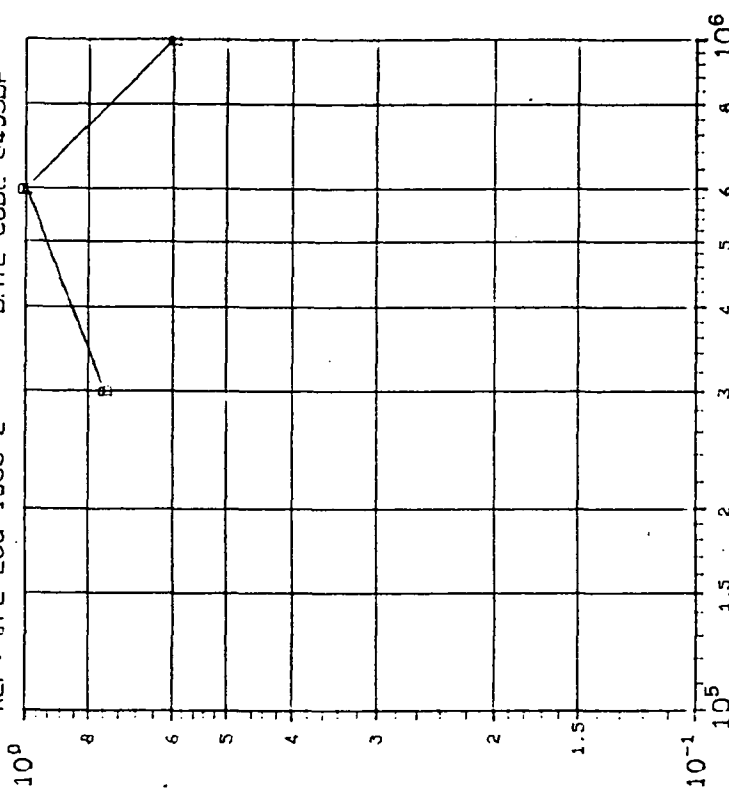
(2)IIL (VIL=0.4V) IN NA: VS DOSE

INITIAL MEAN VALUE IIL (NA) = ***X10⁻¹

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-2 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

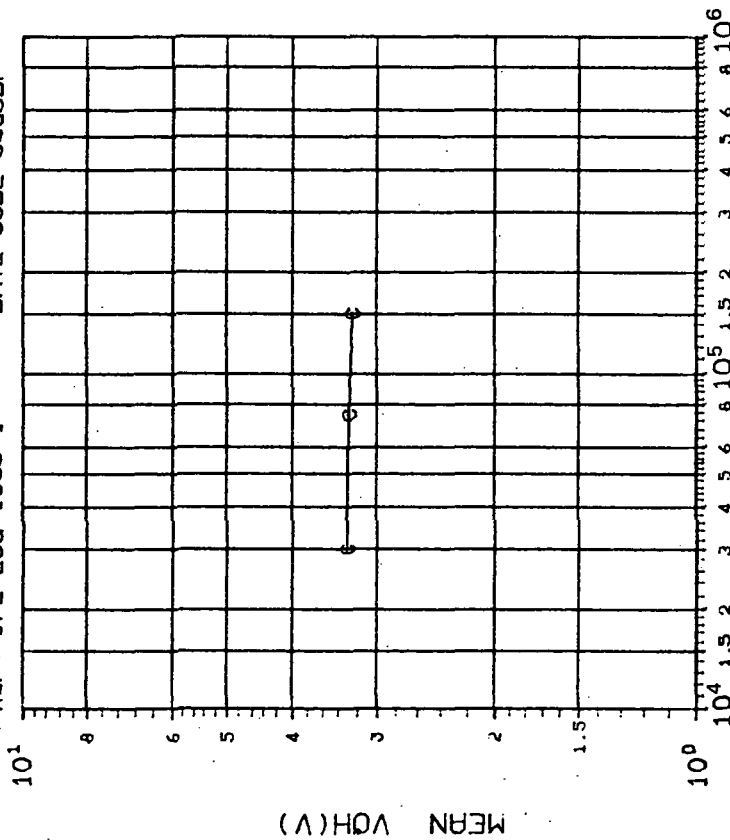
(2)IIL (VIL=0.4V) IN NA: VS DOSE

INITIAL MEAN VALUE IIL (NA) = ***X10⁻¹

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

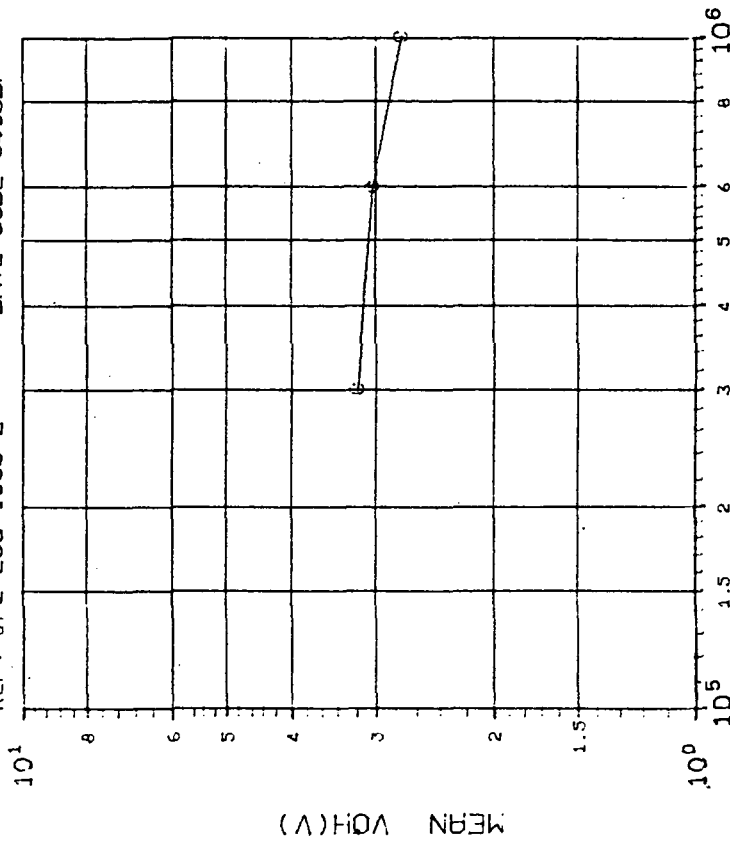
REF: JPL LOG 1063-1 DATE CODE 8403DP



DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

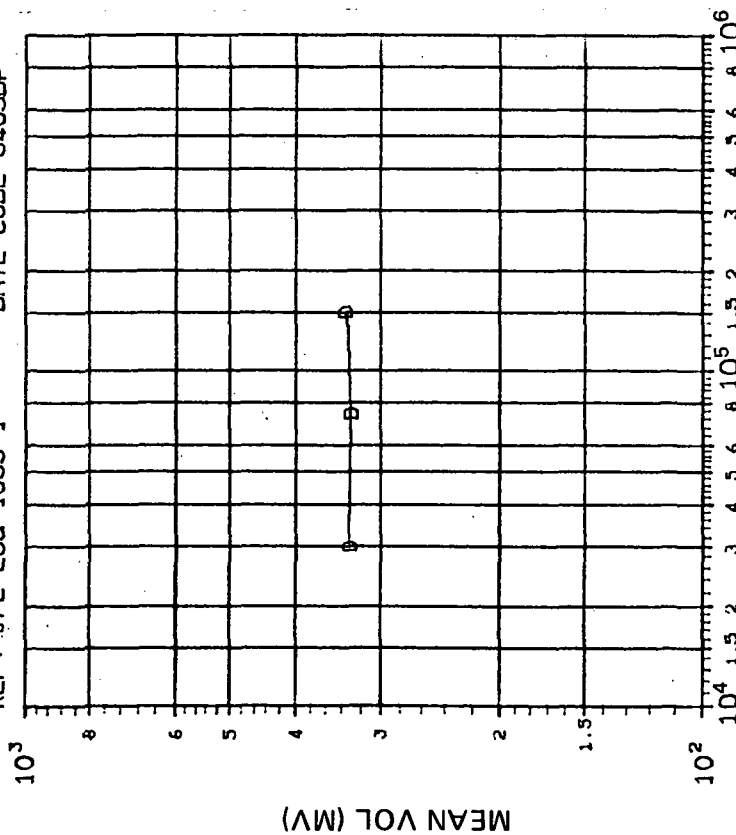
REF: JPL LOG 1063-2 DATE CODE 8403DP



DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-1 DATE CODE 8405DP



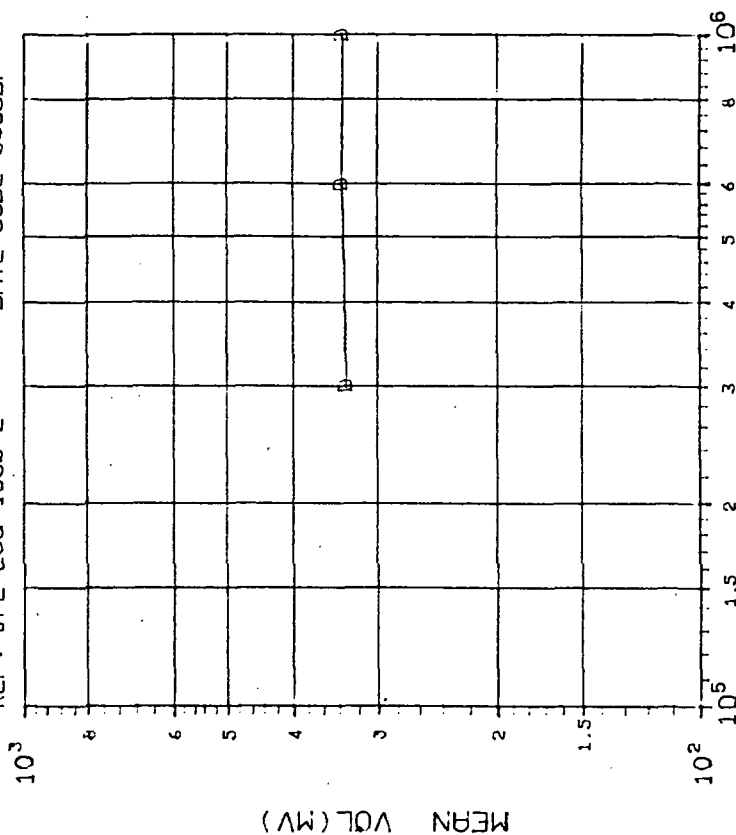
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 30 75 150 |
| | 5.509 4.030 5.334 |

INITIAL MEAN VALUE VOL (MV) = $3.31 \times 10^{+2}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-2 DATE CODE 8405DP



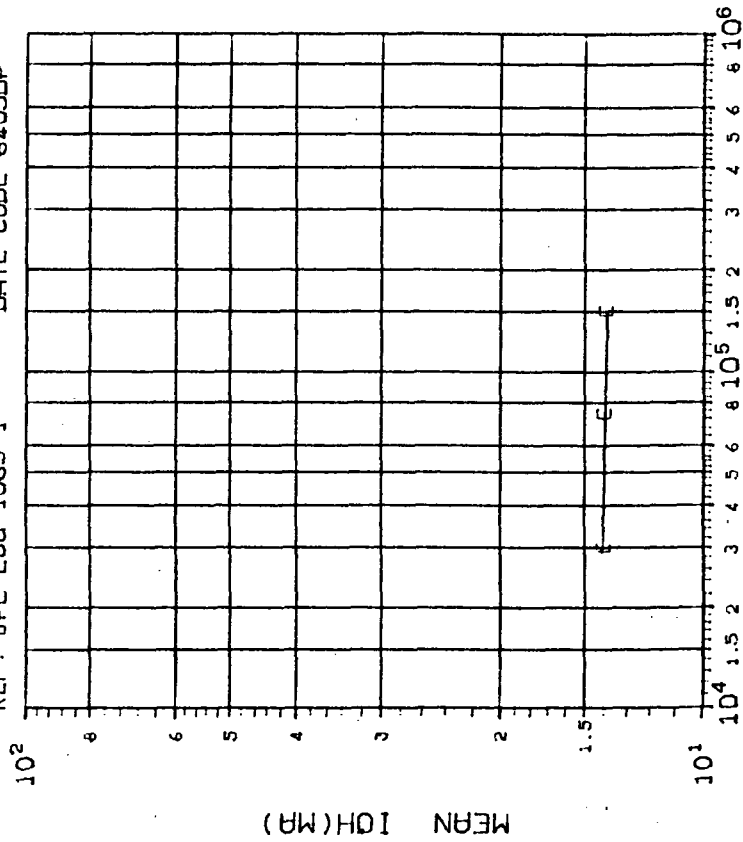
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 300 600 1000 |
| | 3.427 2.632 3.186 |

INITIAL MEAN VALUE VOL (MV) = $3.31 \times 10^{+2}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-1 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(5)IOH (VOH=2.4V) IN MA: VS DOSE

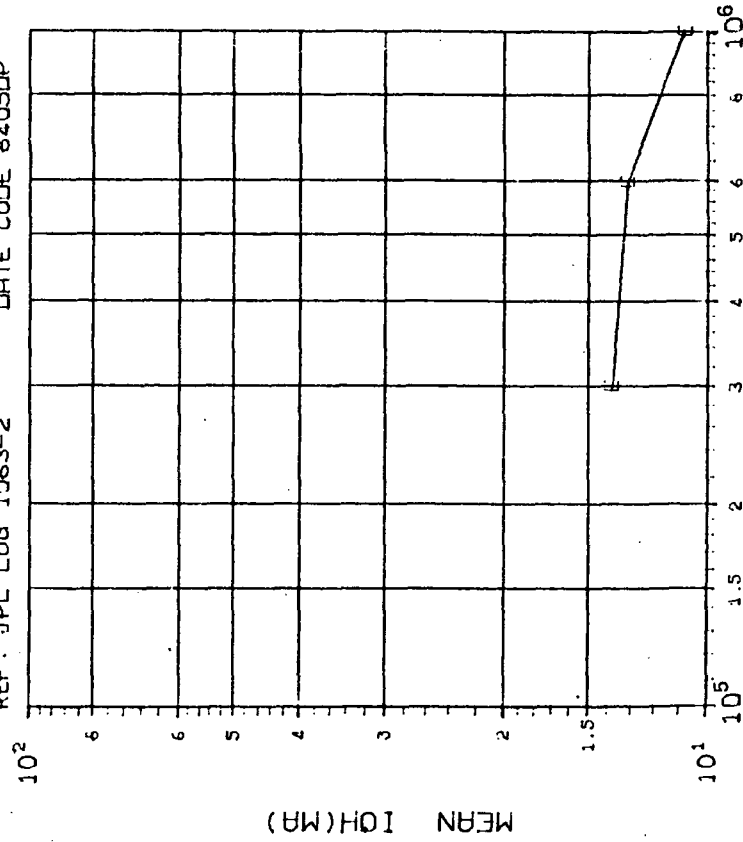
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 30 75 150 |
| | .6955 .6560 .6664 |

INITIAL MEAN VALUE IOH(MA) = $1.41 \times 10^{+1}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-2 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(5)IOH (VOH=2.4V) IN MA: VS DOSE

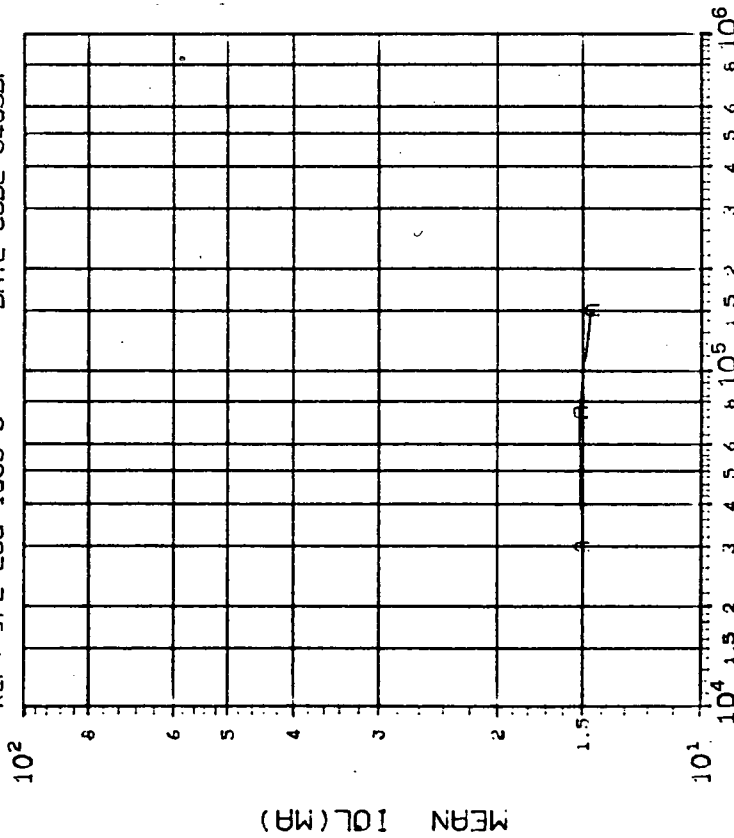
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 300 600 1000 |
| | .6414 1.539 5.032 |

INITIAL MEAN VALUE IOH(MA) = $1.41 \times 10^{+1}$

DEVICE TYPE: QM6148 8BIT ADC

MFG: AMD 3 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-3 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(1) IOL (VOL=0.4V) IN MA: VS DOSE

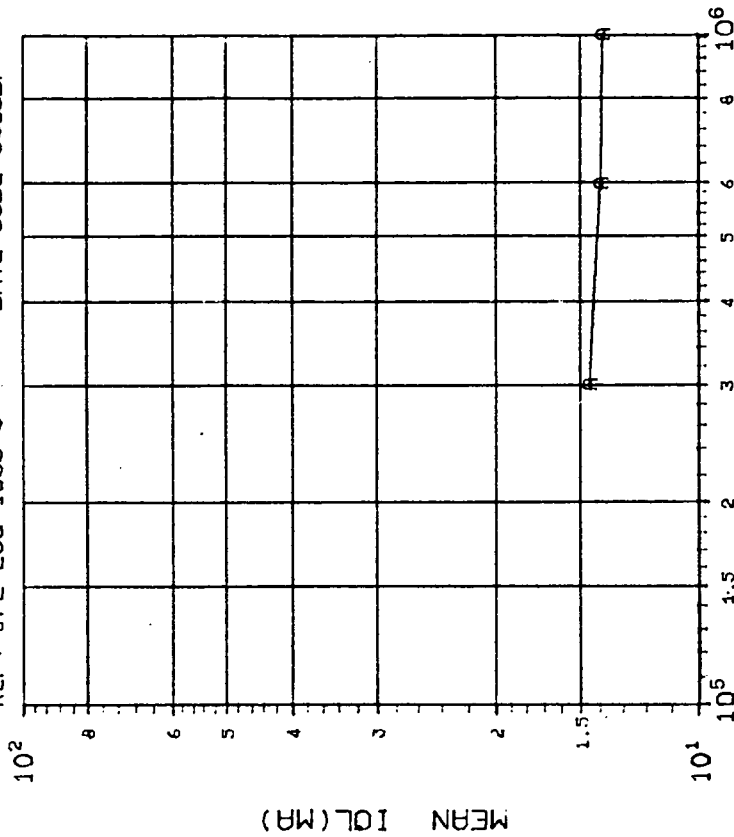
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| A | .5612 | .5652 .2552 |

INITIAL MEAN VALUE IOL(MA) = $1.56 \times 10^{+1}$

DEVICE TYPE: QM6148 8BIT ADC

MFG: AMD 3 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-4 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(1) IOL (VOL=0.4V) IN MA: VS DOSE

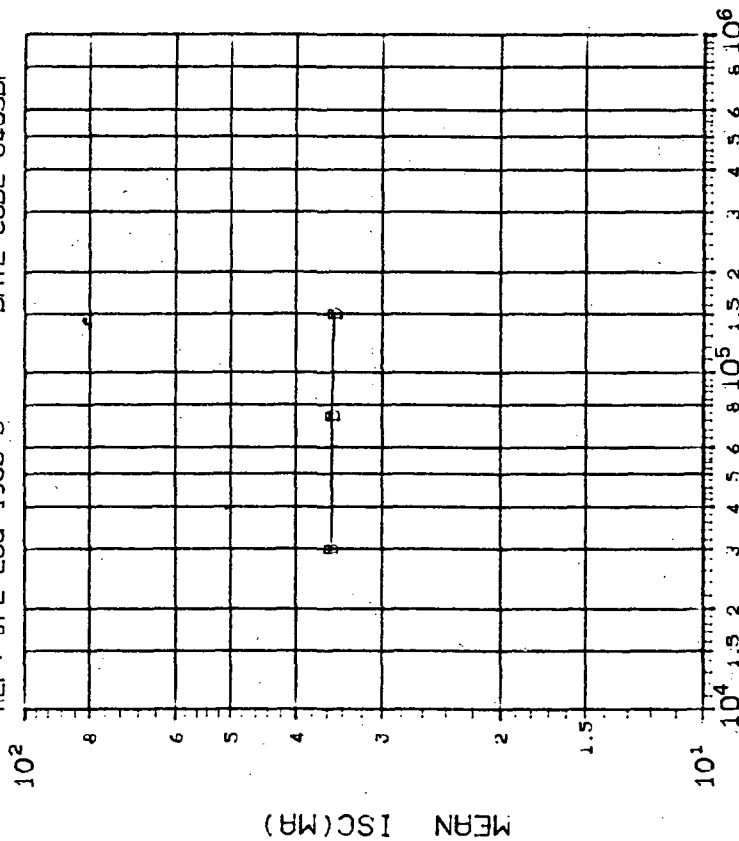
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 300 | 600 1000 |
| A | .4440 | .2795 .3502 |

INITIAL MEAN VALUE IOL(MA) = $1.56 \times 10^{+1}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-3 DATE CODE 8405DP



(2)ISC (V0=0V) IN MA: VS DOSE

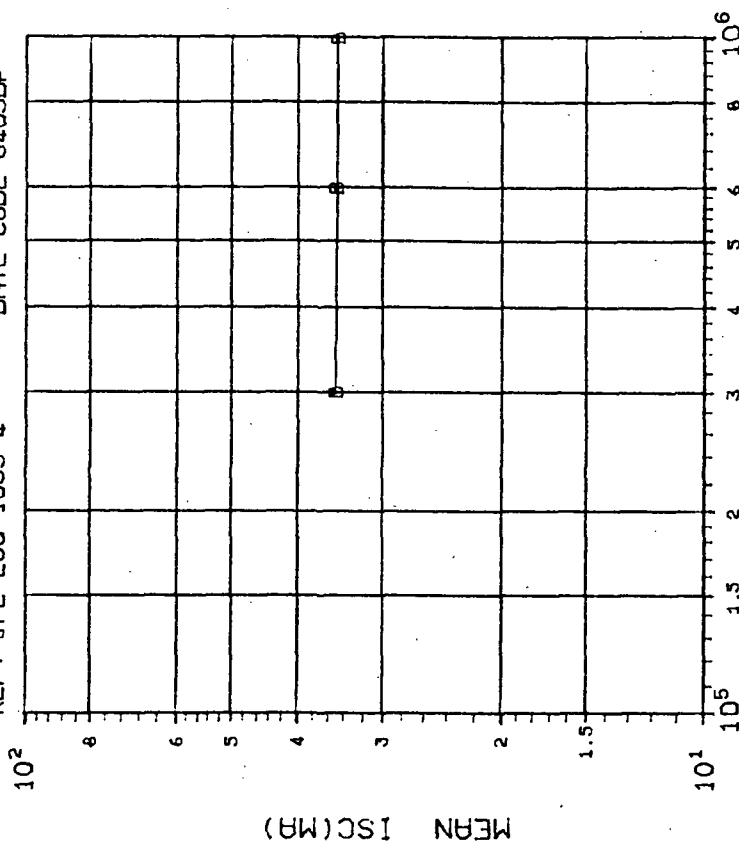
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 30 75 150 |
| | 2.126 1.994 2.041 |

INITIAL MEAN VALUE ISC(MA) = 3.57×10^{-4}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-4 DATE CODE 8405DP



(2)ISC (V0=0V) IN MA: VS DOSE

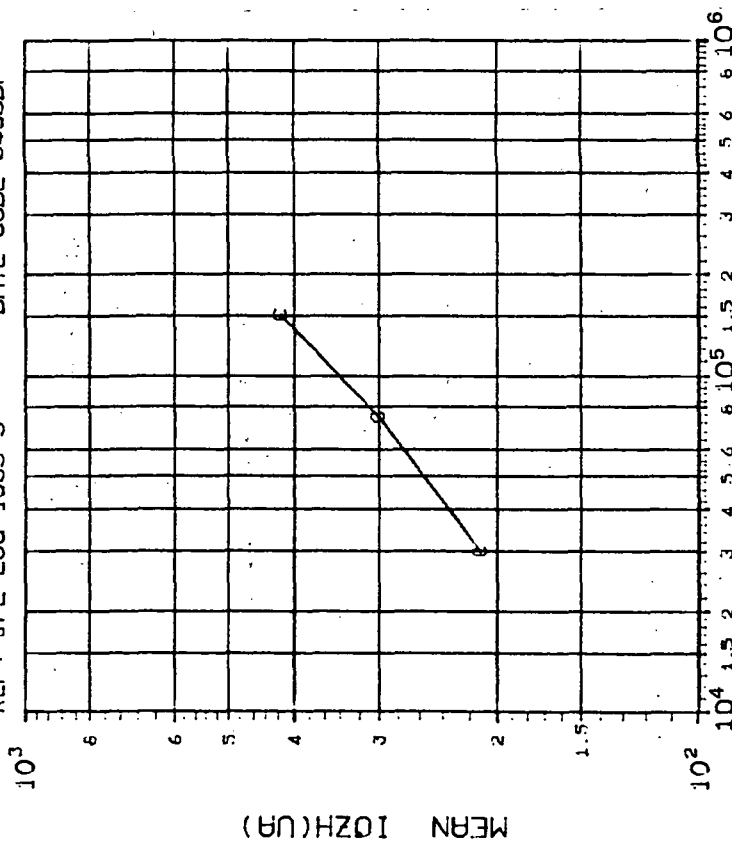
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 300 600 1000 |
| | 2.003 2.022 1.897 |

INITIAL MEAN VALUE ISC(MA) = 3.57×10^{-4}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-3 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(3)10ZH (V0=5.0V) IN UA: VS DOSE

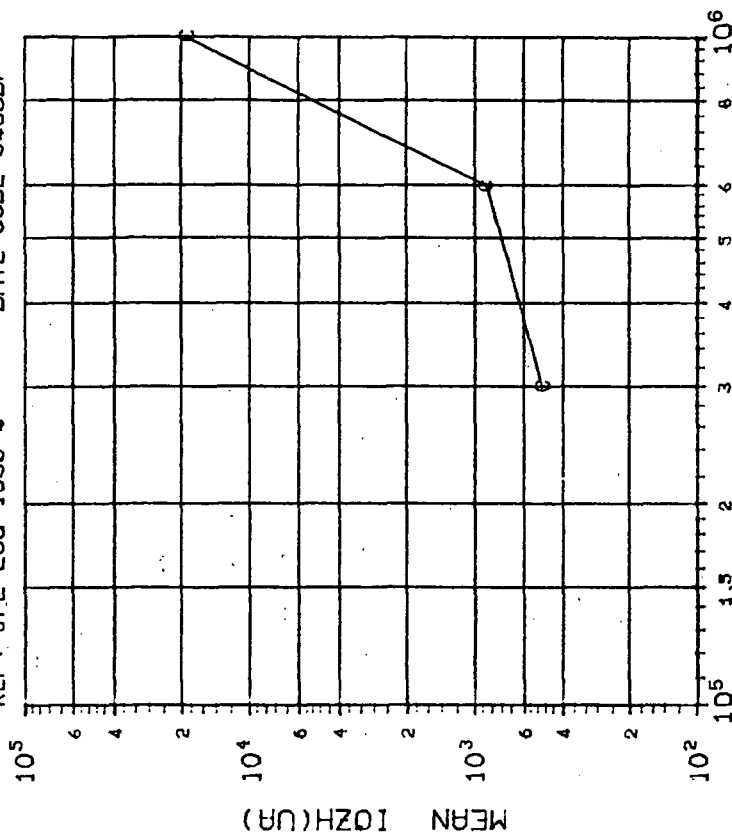
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 30 75 150 |
| C | 62.19 63.61 69.17 |

INITIAL MEAN VALUE 10ZH(UA) = $1.26 \times 10^{+2}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-4 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(3)10ZH (V0=5.0V) IN UA: VS DOSE

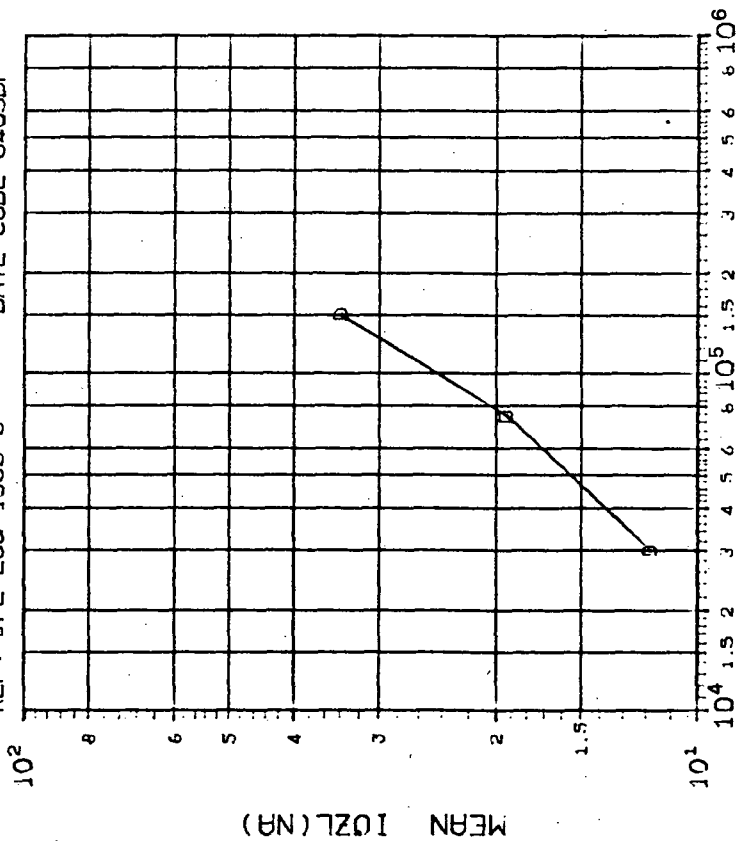
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 300 600 1000 |
| C | 141.2 202.3 ***** |

INITIAL MEAN VALUE 10ZH(UA) = $1.26 \times 10^{+2}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-3 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(4)IOZL (V0=0V) IN NA: VS DOSE

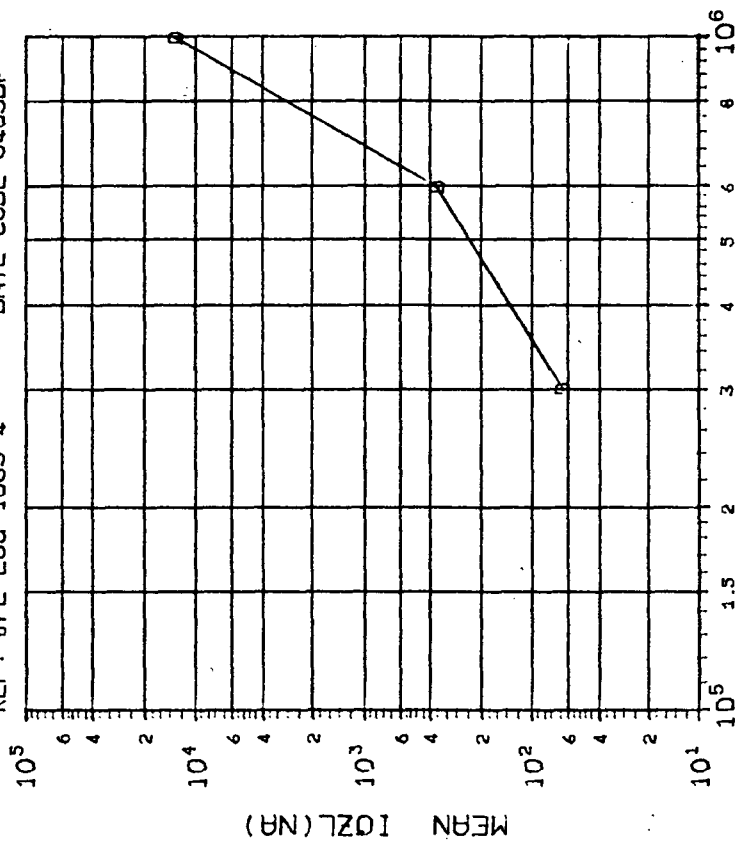
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 30 |
| | 75 |
| | 150 |
| 6.666 11.39 20.90 | |

INITIAL MEAN VALUE IOZL(NA) = 4.78X10⁺²

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-4 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(4)IOZL (V0=0V) IN NA: VS DOSE

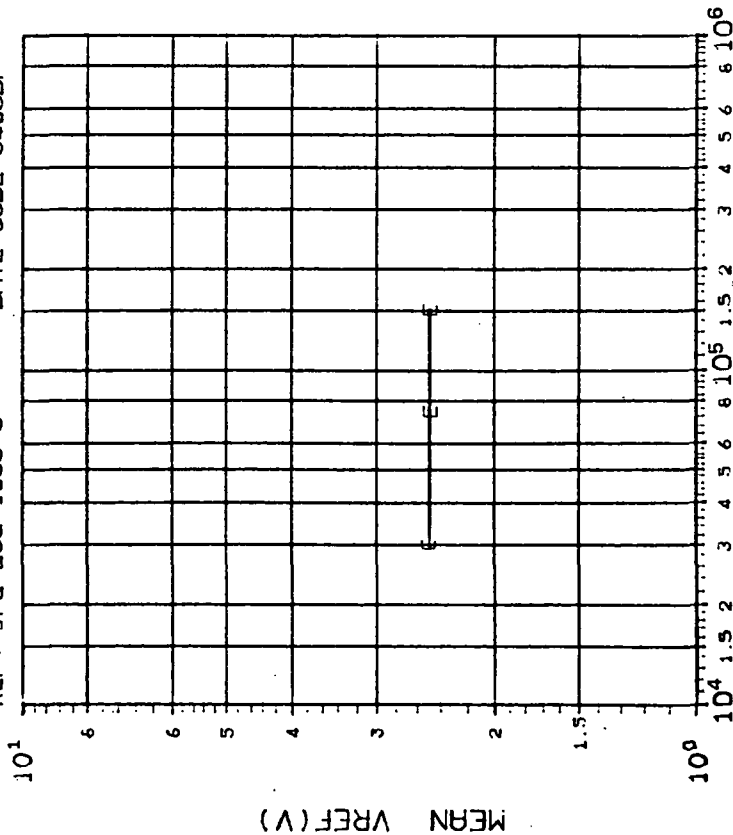
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 300 |
| | 600 |
| | 1000 |
| 40.46 350.0 ***** | |

INITIAL MEAN VALUE IOZL(NA) = 4.78X10⁺⁰

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-3 DATE CODE 8405DP



DOSE, rad(Si) 2.5 MeV electrons

(5)VREF (NO LOAD) IN V : VS DOSE

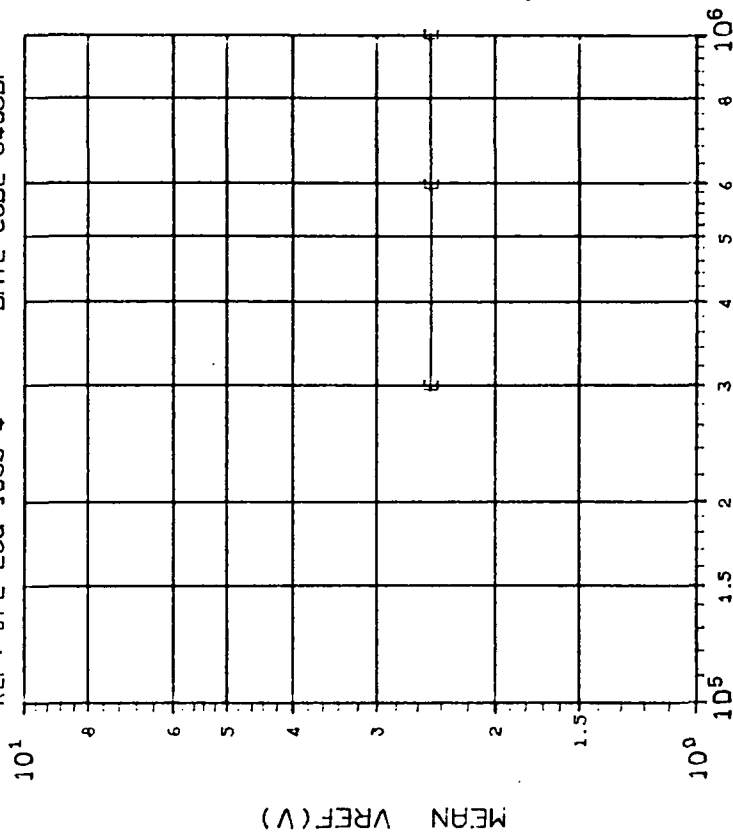
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 30 75 150 |
| E | .0052 .0052 .0047 |

INITIAL MEAN VALUE VREF(V) = $2.51 \times 10^{+0}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-4 DATE CODE 8405DP



DOSE, rad(Si) 2.5 MeV electrons

(5)VREF (NO LOAD) IN V : VS DOSE

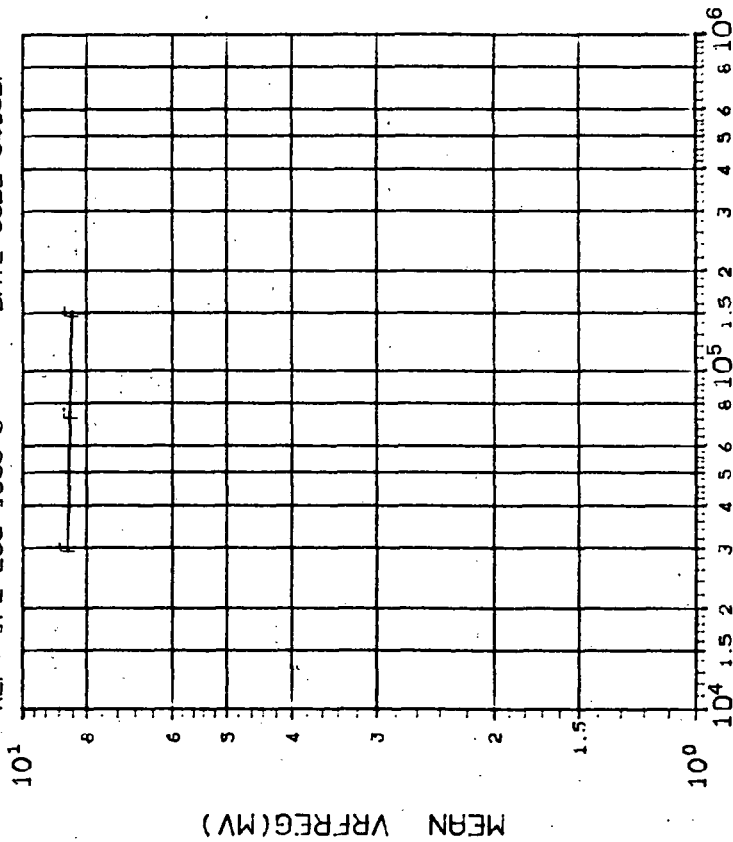
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 300 600 1000 |
| E | .0088 .0042 .0044 |

INITIAL MEAN VALUE VREF(V) = $2.51 \times 10^{+0}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-3 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(6) VRFREG (10⁻⁵MA) IN MV: VS DOSE

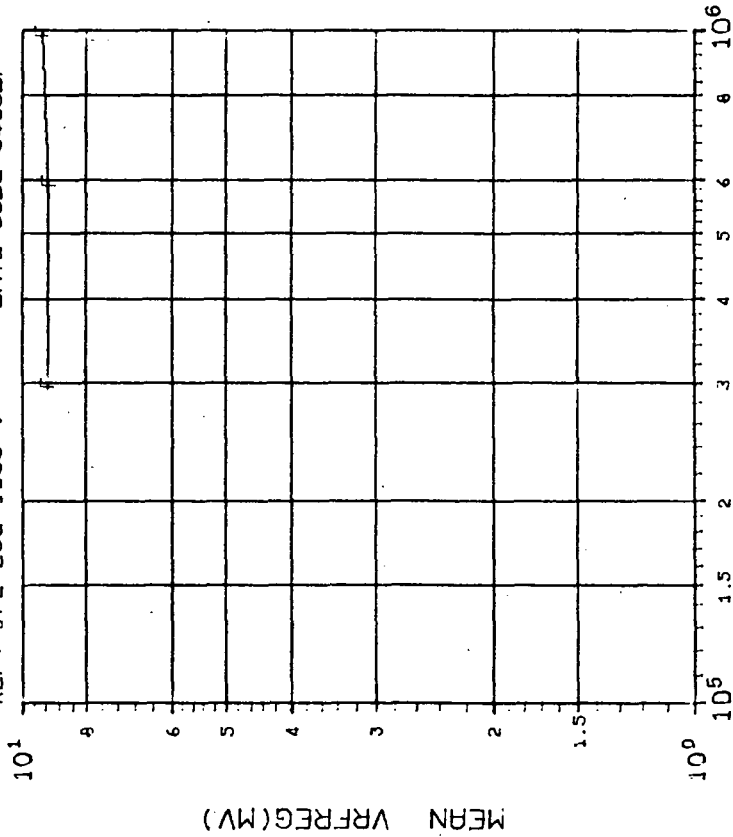
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| F | .3014 | .6118 .4964 |

INITIAL MEAN VALUE VRFREG(MV) = $8.56 \times 10^{+0}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-4 DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(6) VRFREG (10⁻⁵MA) IN MV: VS DOSE

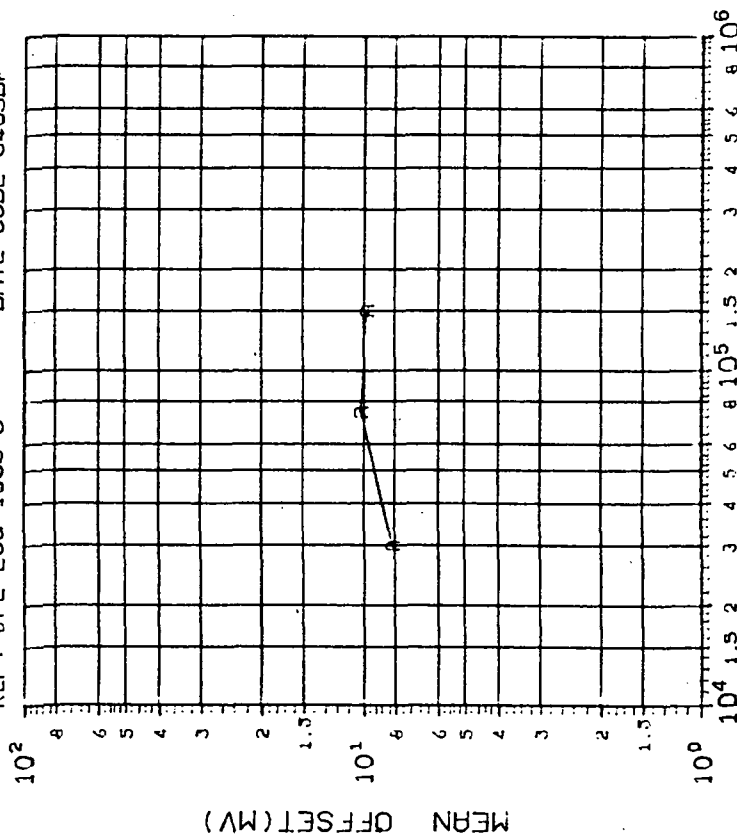
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 300 | 600 1000 |
| F | 1.188 | .5557 1.195 |

INITIAL MEAN VALUE VRFREG(MV) = $8.56 \times 10^{+0}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-3 DATE CODE 8405DP



DOSE, rad(Si) 2.5 MeV electrons

(1) OFFSET (VOLTS) IN MV: VS DOSE

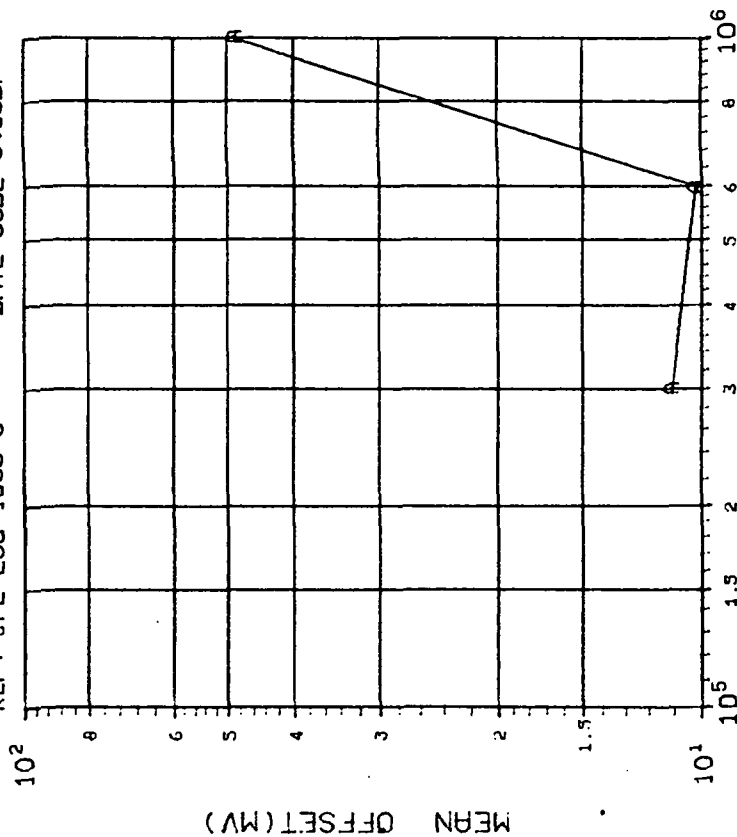
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 30 |
| | 75 |
| | 150 |
| A | 1.339 |
| | 1.142 |
| | 1.758 |

INITIAL MEAN VALUE OFFSET(MV) = 8.25×10^{-4}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-6 DATE CODE 8405DP



DOSE, rad(Si) 2.5 MeV electrons

(1) OFFSET (VOLTS) IN MV: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 300 |
| | 600 |
| | 1000 |
| A | .8809 |
| | 3.073 |
| | 88.35 |

INITIAL MEAN VALUE OFFSET(MV) = 8.25×10^{-4}

DEVICE TYPE: AM6148 8BIT ADC

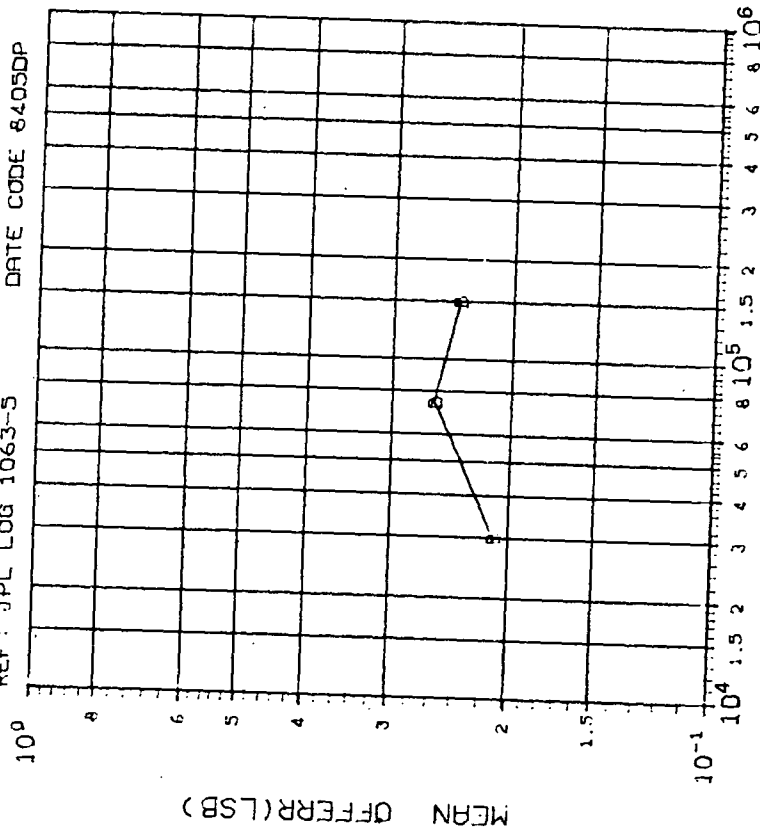
MFG: AMD

5 DEVICES

TEST DATE 7-19-84

REF: JPL LOG 1063-5

DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(2)OFFERR (LSB) IN LSB: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 30 |
| | 75 |
| | 150 |
| .0343 .0292 .0465 | |

INITIAL MEAN VALUE OFFERR(LSB) = 2.11×10^{-1}

DEVICE TYPE: AM6148 8BIT ADC

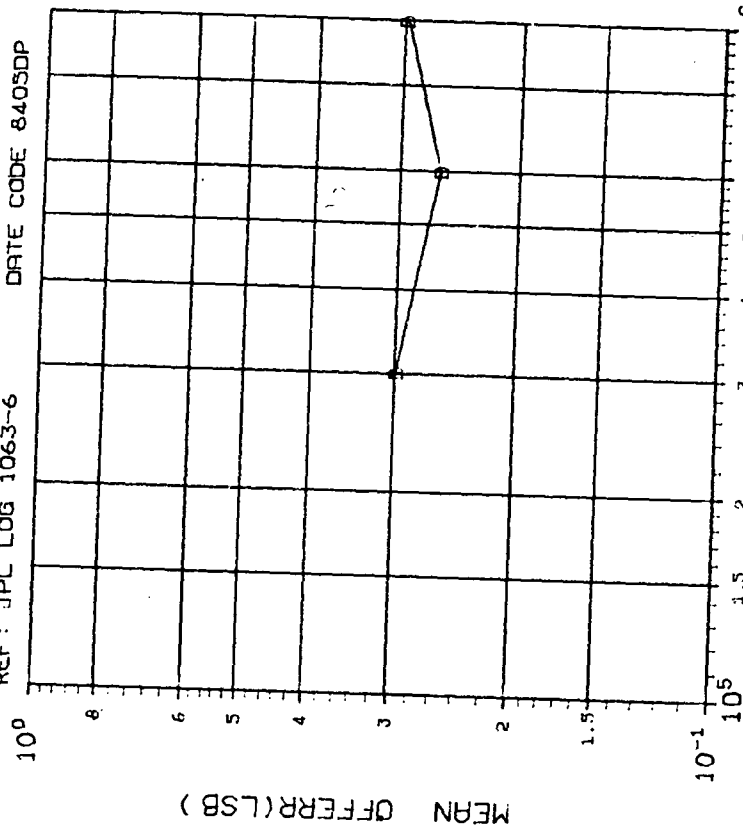
MFG: AMD

5 DEVICES

TEST DATE 7-19-84

REF: JPL LOG 1063-6

DATE CODE 8405DP



DOSE, rads(Si) 2.5 MeV electrons

(2)OFFERR (LSB) IN LSB: VS DOSE

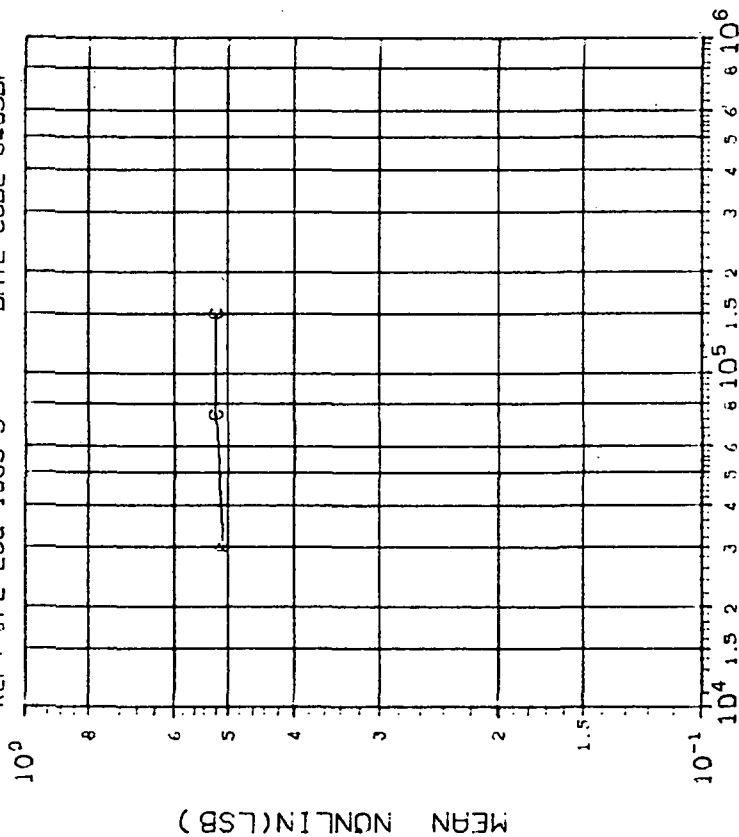
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 300 |
| | 600 |
| | 1000 |
| .0401 .0786 .1409 | |

INITIAL MEAN VALUE OFFERR(LSB) = 2.11×10^{-1}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-5 DATE CODE 8405DP



DOSE, rad(Si) 2.5 MeV electrons

(3)NONLIN (LSB) IN LSB: VS DOSE

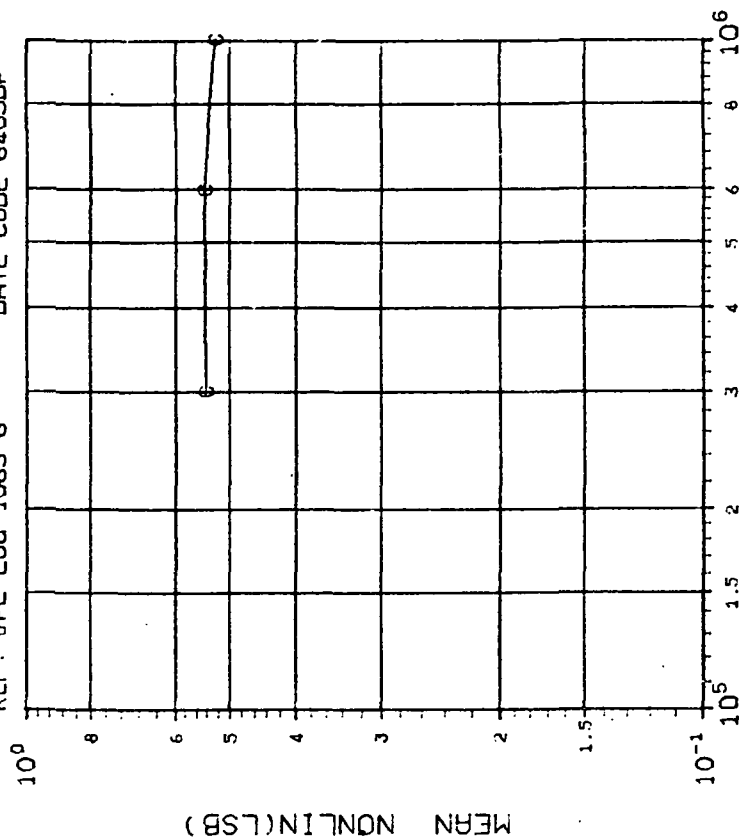
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| C | .0381 | .0199 .0329 |

INITIAL MEAN VALUE NONLIN(LSB)= 4.81×10^{-1}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-6 DATE CODE 8405DP



DOSE, rad(Si) 2.5 MeV electrons

(3)NONLIN (LSB) IN LSB: VS DOSE

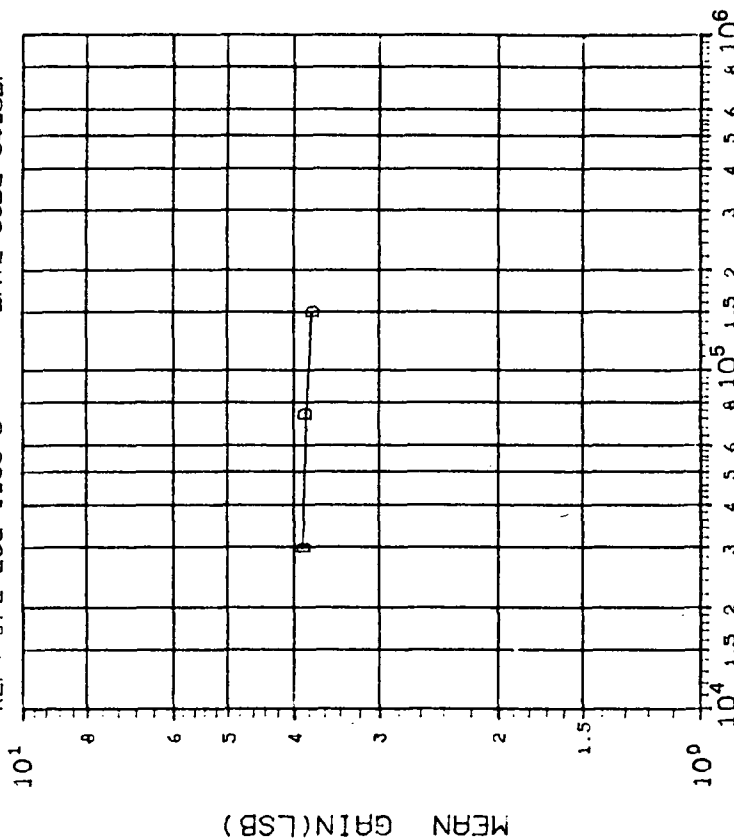
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 300 | 600 1000 |
| C | .0303 | .0343 .0669 |

INITIAL MEAN VALUE NONLIN(LSB)= 4.81×10^{-1}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-5 DATE CODE 8405DP



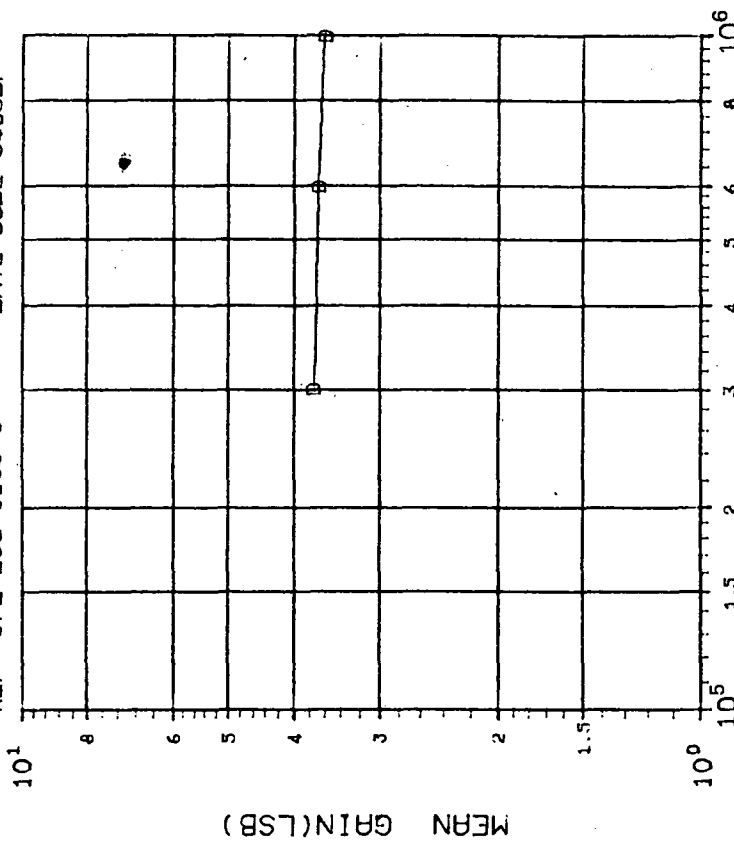
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 |
| D | .2915 | .2851 .2990 |

INITIAL MEAN VALUE GAIN(LSB) = 3.93×10^{-9}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-6 DATE CODE 8405DP



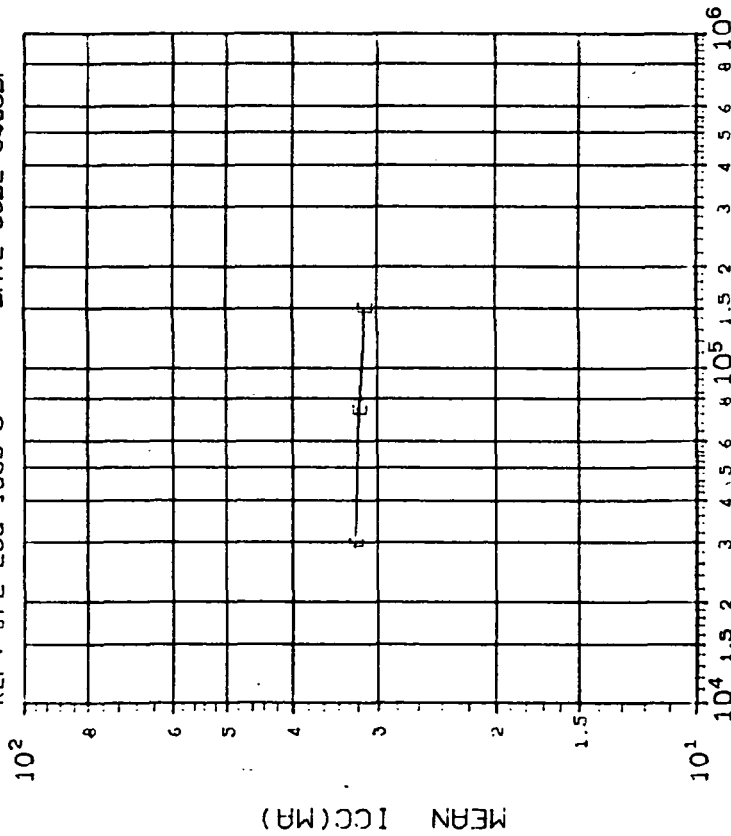
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 300 | 600 1000 |
| D | .2622 | .2662 .2729 |

INITIAL MEAN VALUE GAIN(LSB) = 3.93×10^{-9}

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-5 DATE CODE 8405DP



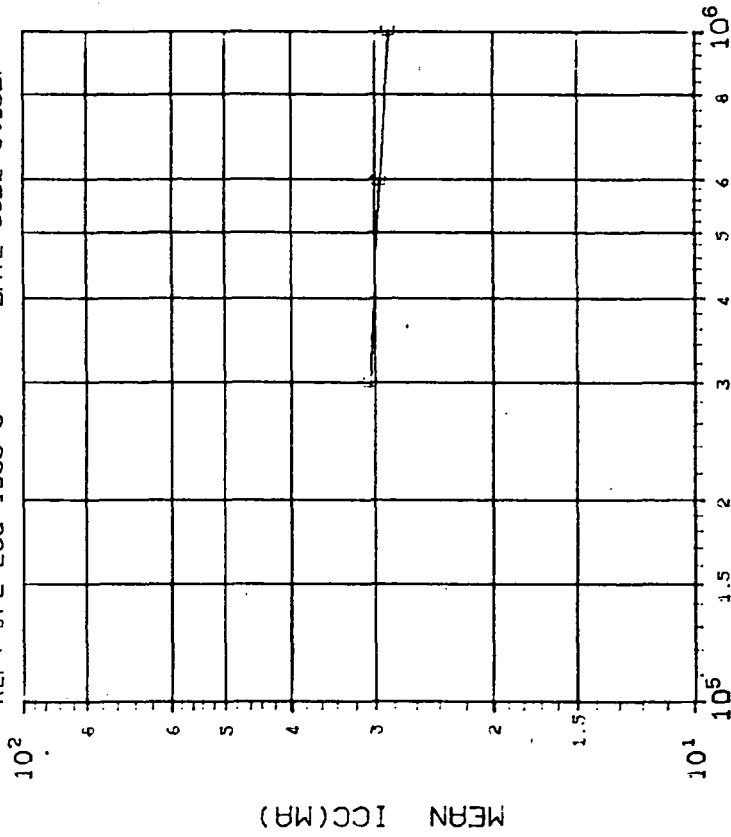
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 30 75 150 |
| | 1.946 1.920 1.676 |

INITIAL MEAN VALUE ICC(MA) = $3.28 \times 10^{+1}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-6 DATE CODE 8405DP



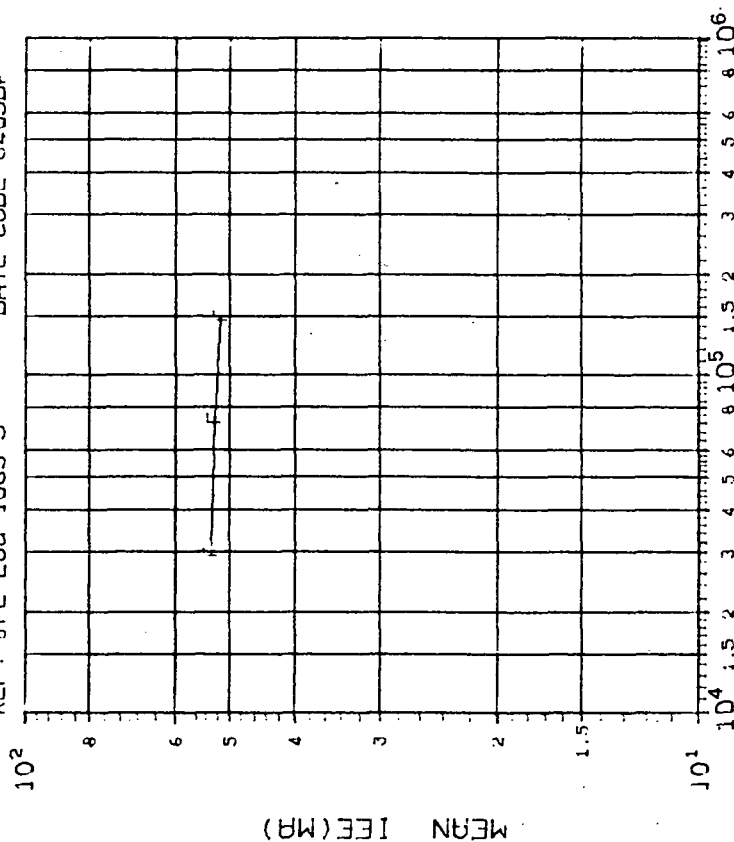
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 300 600 1000 |
| | 1.630 1.746 1.600 |

INITIAL MEAN VALUE ICC(MA) = $3.28 \times 10^{+1}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-5 DATE CODE 8405DP



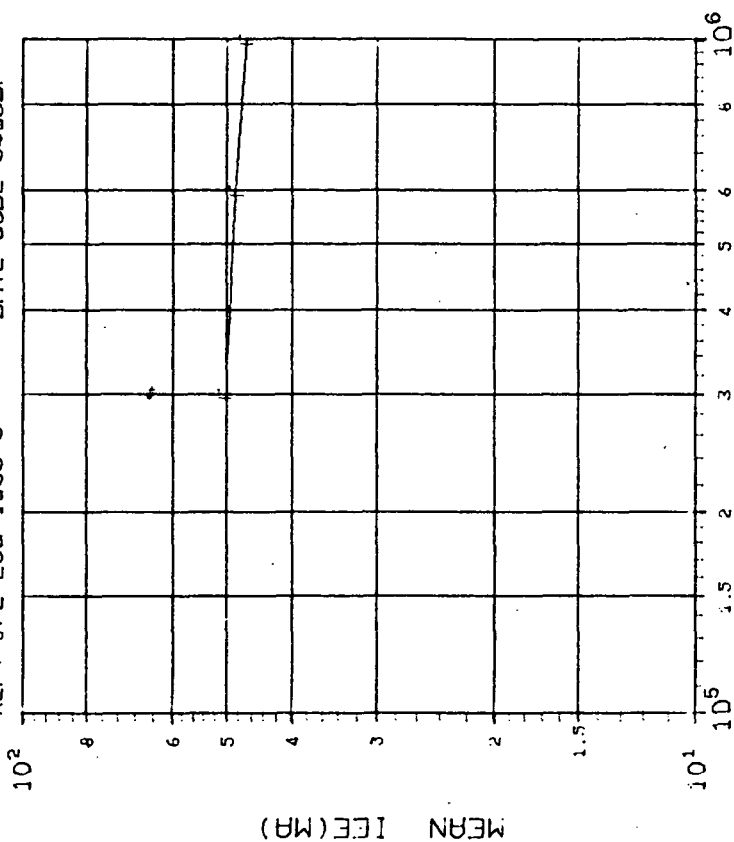
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| F | 30 75 150 |
| | 3.010 2.944 2.888 |

INITIAL MEAN VALUE IEE(MA) = $5.43 \times 10^{+1}$

DEVICE TYPE: AM6148 8BIT ADC

MFG: AMD 5 DEVICES TEST DATE 7-19-84

REF: JPL LOG 1063-6 DATE CODE 8405DP



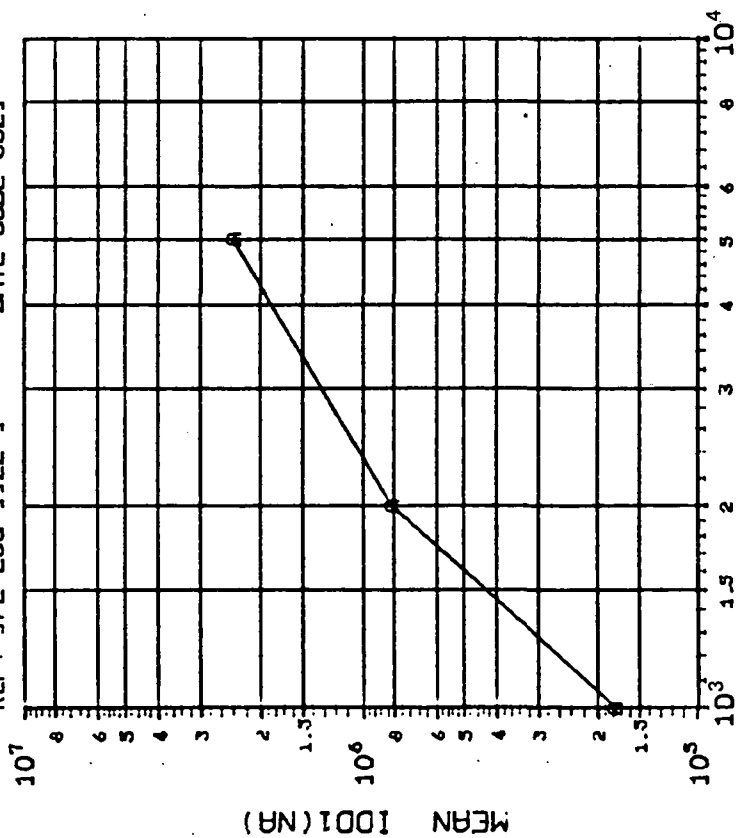
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| F | 300 600 1000 |
| | 2.770 2.601 2.394 |

INITIAL MEAN VALUE IEE(MA) = $5.43 \times 10^{+1}$

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-1 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(1)IDD1 (VDD=15V) IN NA: VS DOSE

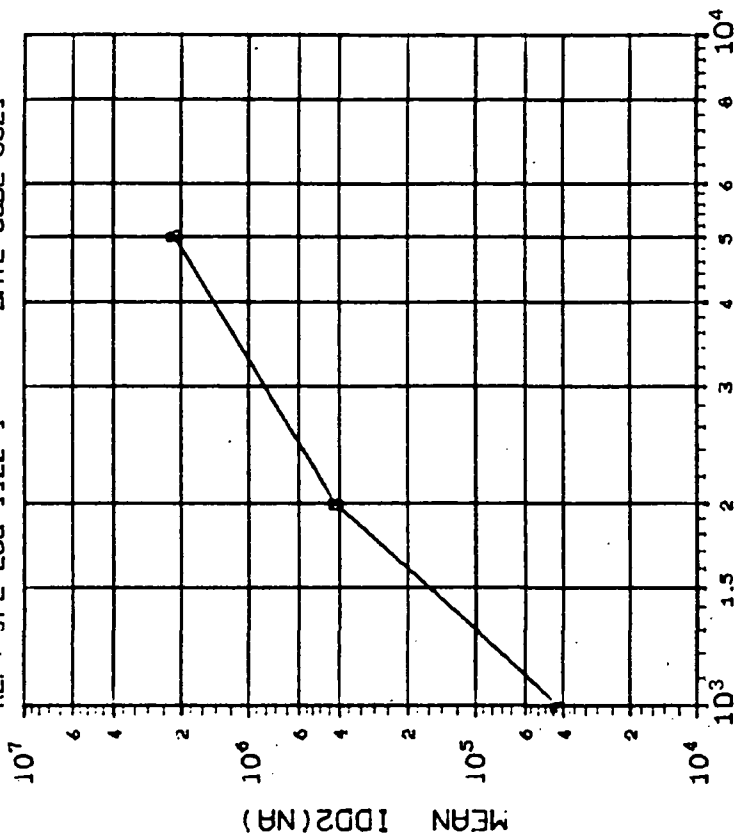
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 1 2 3 |
| | ***** ***** ***** |

INITIAL MEAN VALUE IDD1(NA) = 1.43X10³

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-1 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(2)IDD2 (VDD=15V) IN NA: VS DOSE

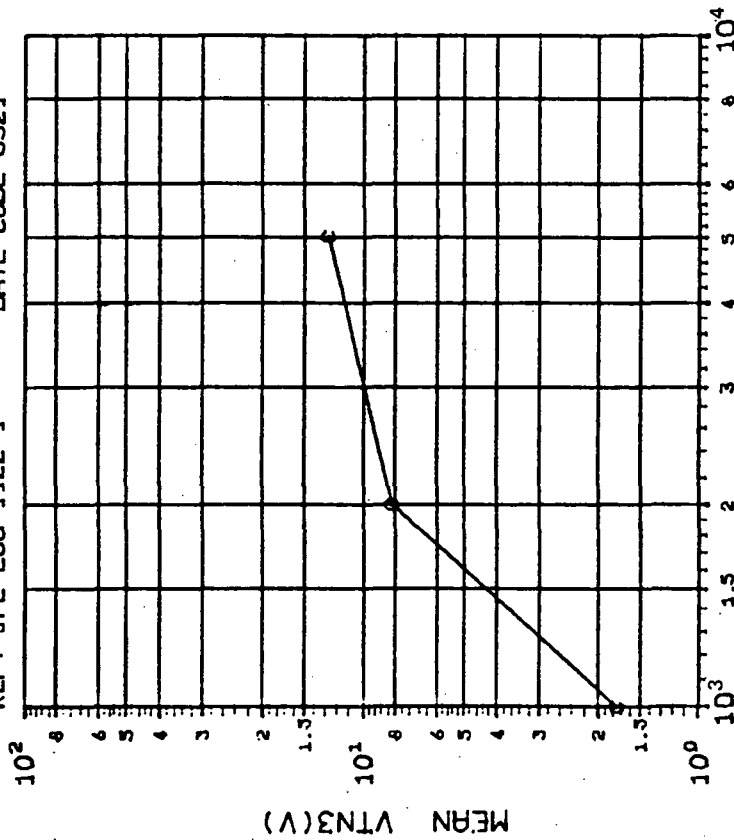
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 1 2 3 |
| | ***** ***** ***** |

INITIAL MEAN VALUE IDD2(NA) = 3.57X10⁴

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-83

REF: JPL LOG 1122-1 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(3)VTN3 (ITNE--10UA) IN VOLTS: VS DOSE

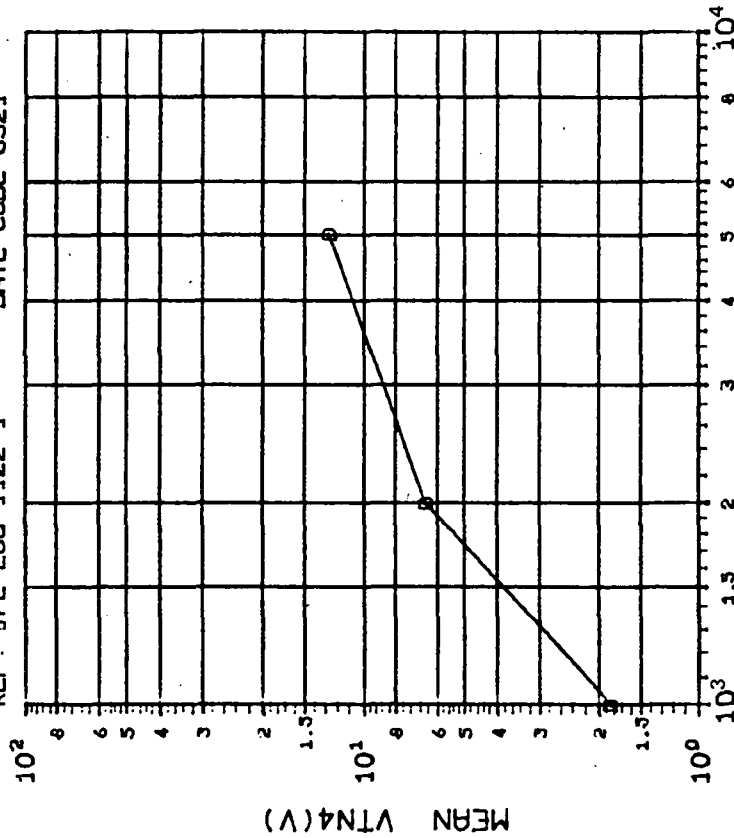
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 1 | 2 |
| C | .2670 | 2.939 |
| | 1.246 | |

INITIAL MEAN VALUE VTN3(V) = $1.99 \times 10^{+0}$

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-83

REF: JPL LOG 1122-1 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(4)VTN4 (ITNE--10UA) IN VOLTS: VS DOSE

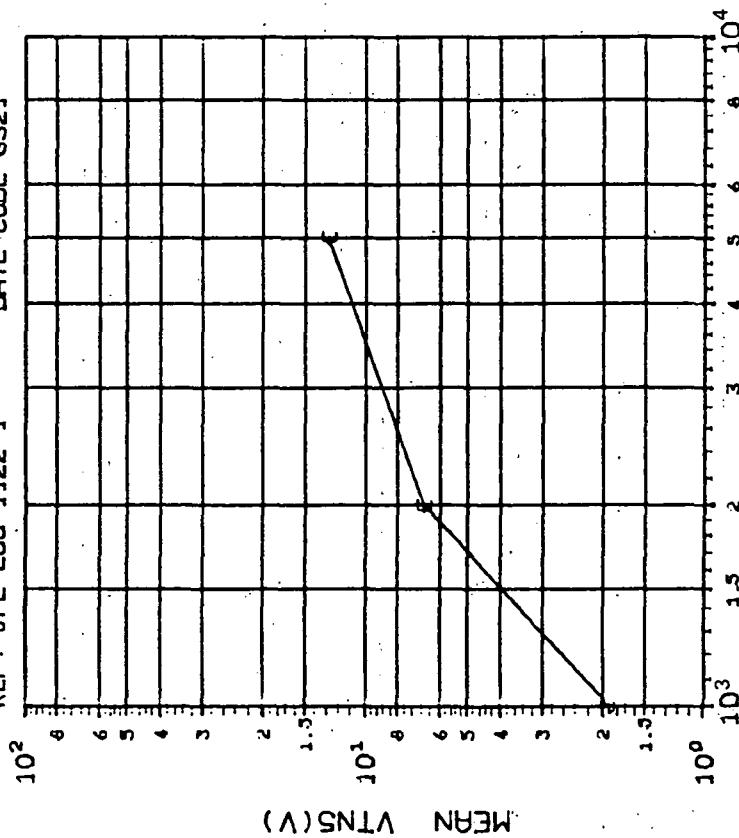
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 1 | 2 |
| D | .2944 | 1.056 |
| | 1.056 | |

INITIAL MEAN VALUE VTN4(V) = $2.09 \times 10^{+0}$

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-1 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(5)VTN5 (ITNE--10UA) IN VOLTS: VS DOSE

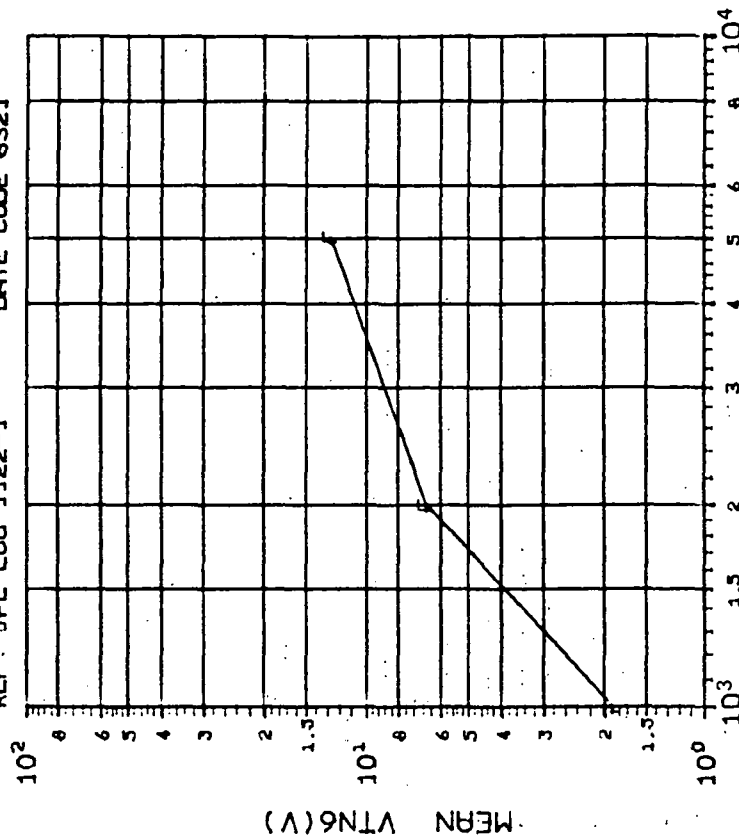
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 1 |
| | 2 |
| | 5 |
| | .2953 1.150 1.201 |

INITIAL MEAN VALUE VTN5(V) = 2.10X10¹⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-1 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(6)VTN6 (ITNE--10UA) IN VOLTS: VS DOSE

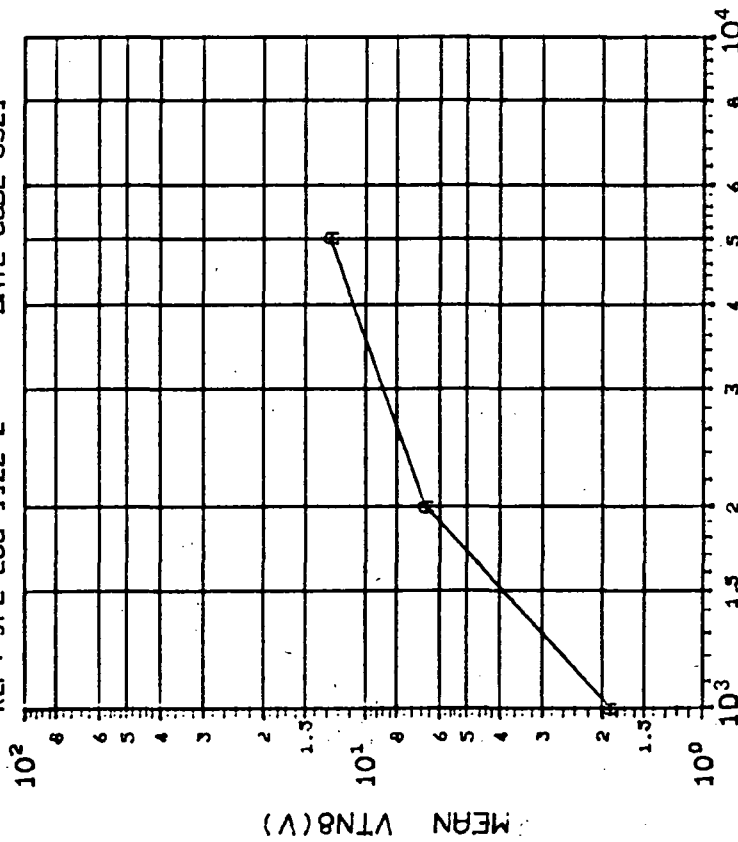
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| F | 1 |
| | 2 |
| | 5 |
| | .2643 1.118 1.218 |

INITIAL MEAN VALUE VTN6(V) = 2.20X10¹⁰

DEVICE TYPE: C04013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-2 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(7)VTN8 (ITN--10UA) IN VOLTS: VS DOSE

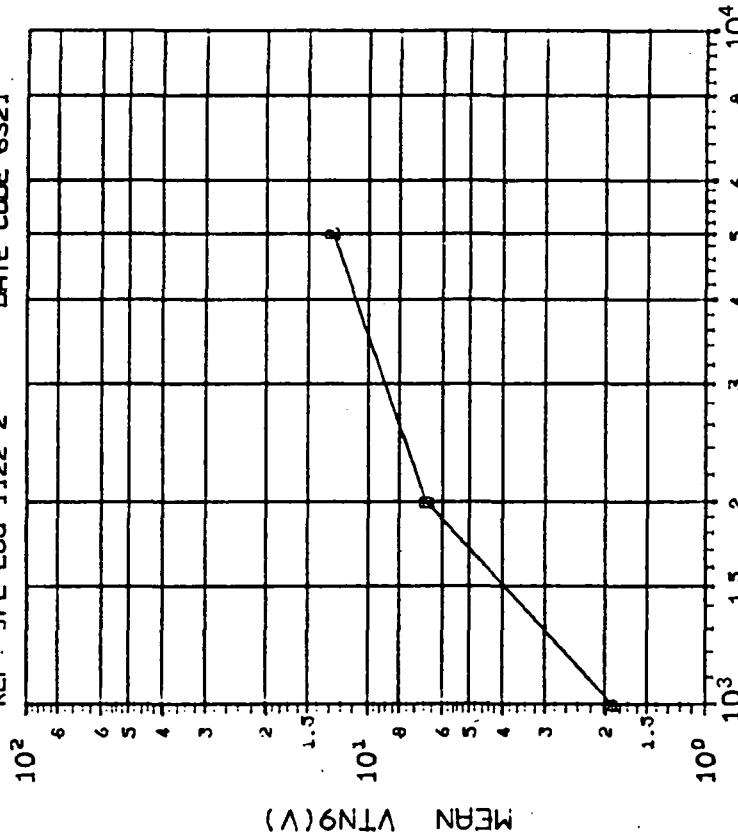
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| A | 1 | 2 |
| | 3 | 5 |
| | .2672 | 1.026 1.169 |

INITIAL MEAN VALUE VTN8(V) = 2.20X10⁺⁰

DEVICE TYPE: C04013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-2 DATE CODE 8321



DOSE, rads(Si) Co 60 Gammas

(8)VTN9 (ITN--10UA) IN VOLTS: VS DOSE

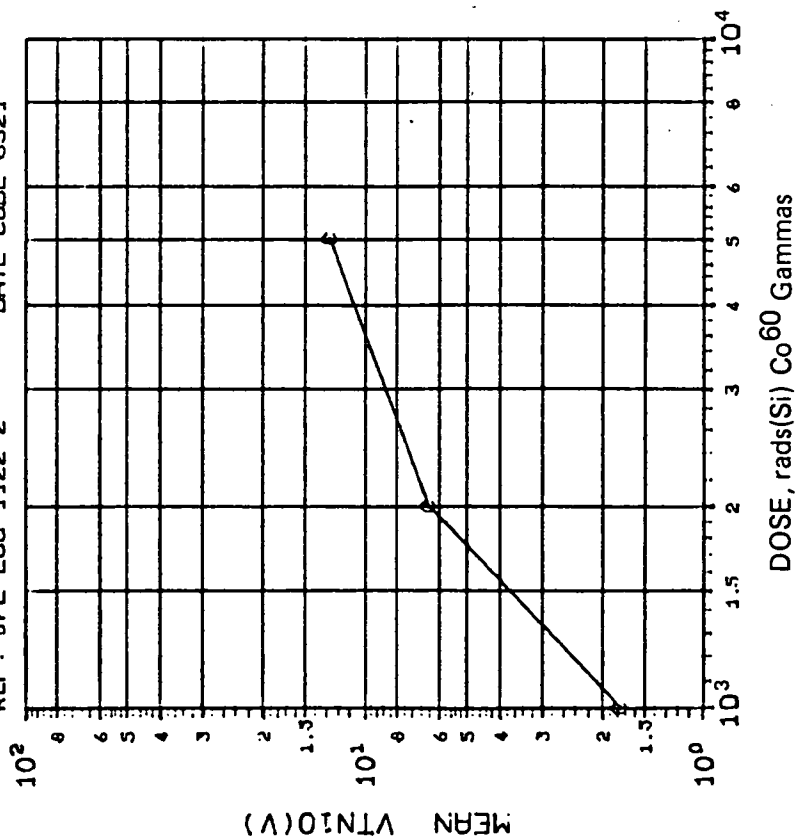
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| B | 1 | 2 |
| | 3 | 5 |
| | .3098 | 1.061 1.161 |

INITIAL MEAN VALUE VTN9(V) = 2.11X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG:SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-2 DATE CODE 6321



(9)VTN10 (ITN=10UA) IN VOLTS: VS DOSE

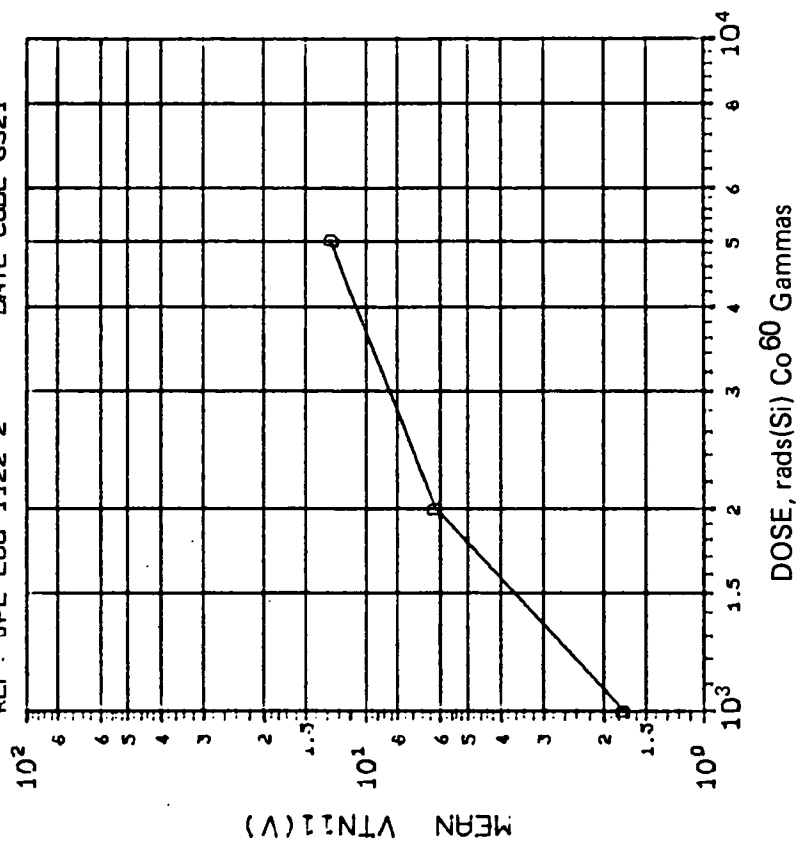
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 1 |
| | 2 |
| | 5 |
| .3035 1.037 1.193 | |

INITIAL MEAN VALUE VTN10(V) = 2.10X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG:SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-2 DATE CODE 6321



(10)VTN11(ITN=10UA) IN VOLTS: VS DOSE

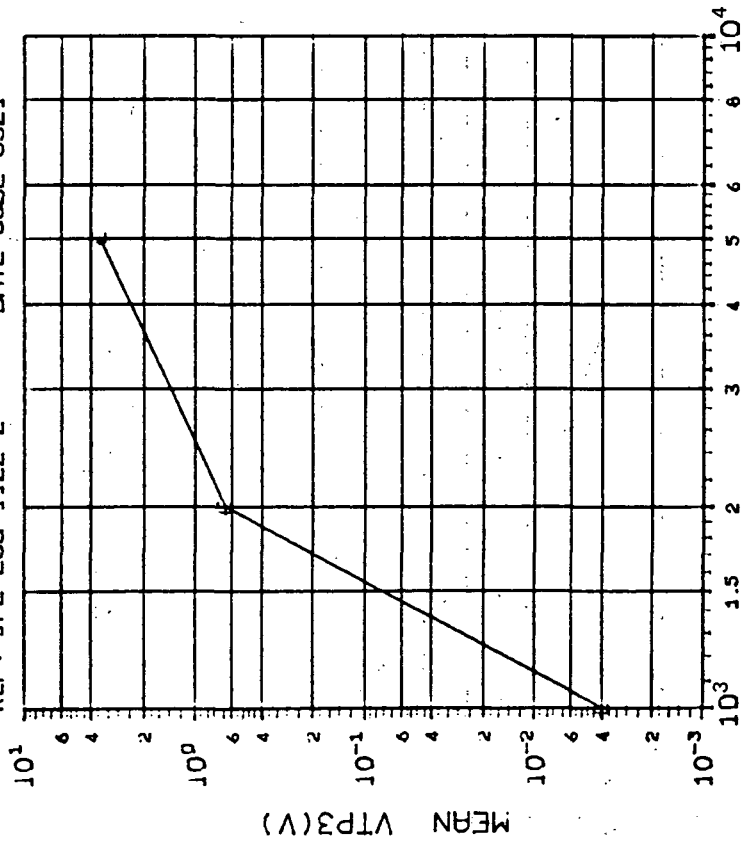
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 1 |
| | 2 |
| | 5 |
| .2715 1.179 1.243 | |

INITIAL MEAN VALUE VTN11(V) = 2.01X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-2 DATE CODE 8321



(11)VTP3 (ITP=+10UA) IN VOLTS: VS DOSE

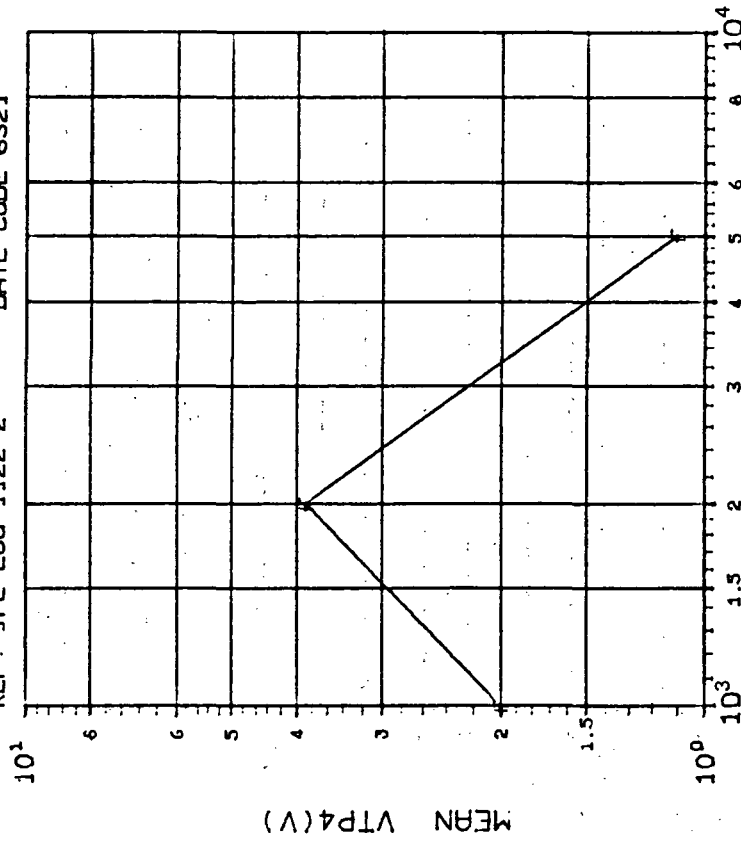
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 1 |
| | 2 |
| | 5 |
| 3.912 .0222 6.352 | |

INITIAL MEAN VALUE VTP3(V) = 1.64X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-2 DATE CODE 8321



(12)VTP4 (ITP=+10UA) IN VOLTS: VS DOSE

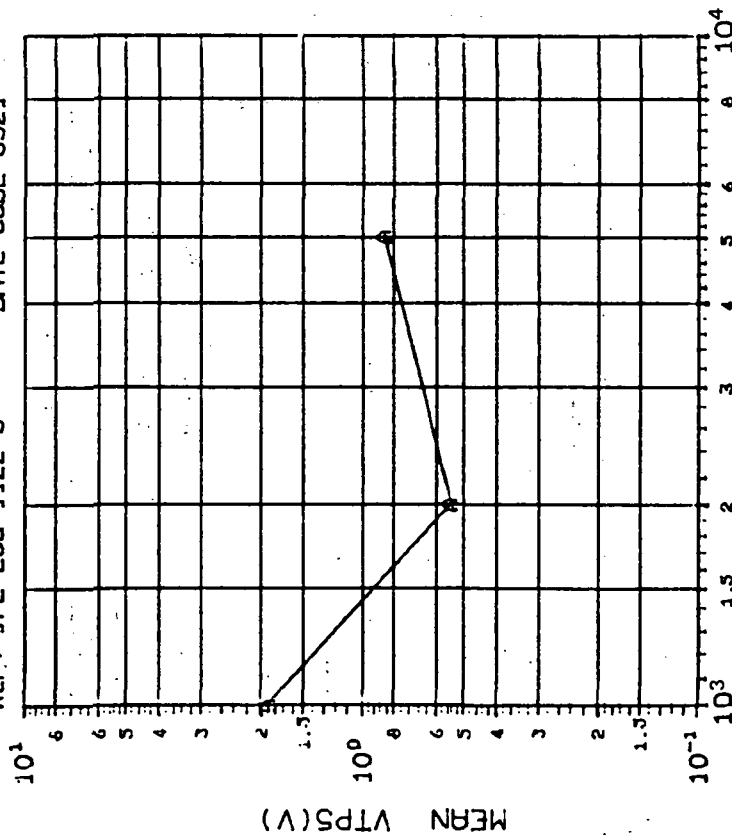
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| F | 1 |
| | 2 |
| | 5 |
| 1.498 6.367 .5174 | |

INITIAL MEAN VALUE VTP4(V) = 1.70X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-83

REF: JPL LOG 1122-3 DATE CODE 8321



DOSE, rads(Si) Co⁶⁰ Gammas

(13) VTP5 (ITP=+10UA) IN VOLTS: VS DOSE

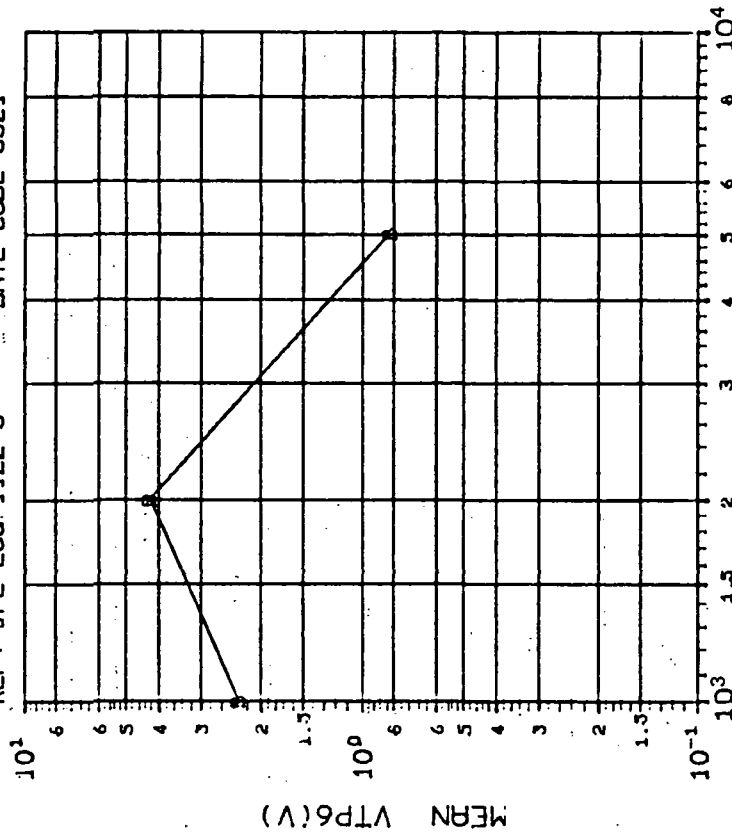
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| A | 1 | 2 |
| | 1.432 | .2805 |
| | .0310 | |

INITIAL MEAN VALUE VTP5(V) = 1.62X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-83

REF: JPL LOG 1122-3 DATE CODE 8321



DOSE, rads(Si) Co⁶⁰ Gammas

(14) VTP6 (ITP=+10UA) IN VOLTS: VS DOSE

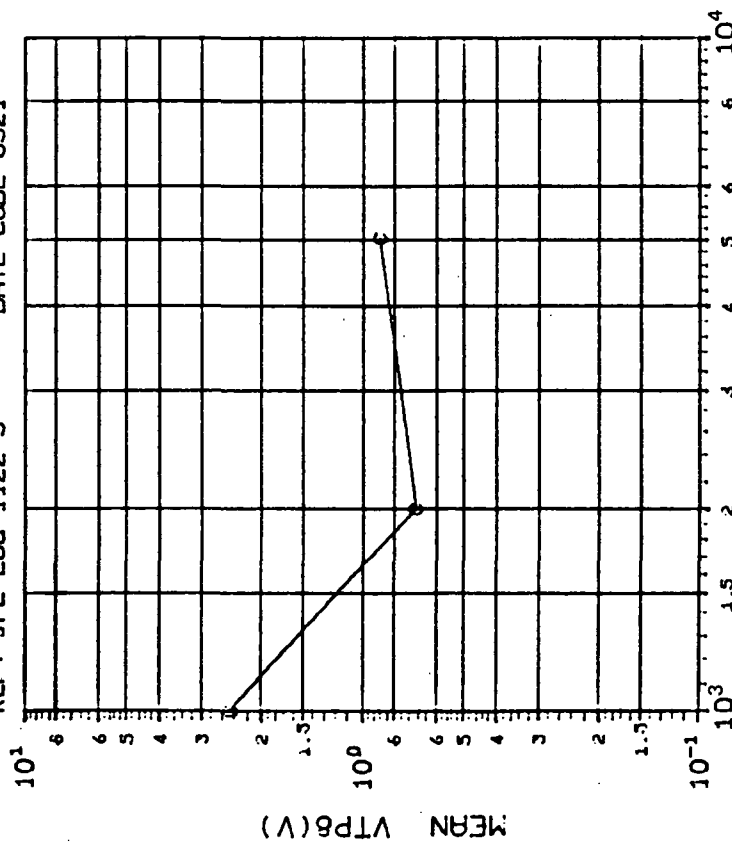
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| B | 1 | 2 |
| | 1.724 | 7.197 |
| | .0238 | |

INITIAL MEAN VALUE VTP6(V) = 1.82X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-3 DATE CODE 8321



(15)VTP8 (ITP=+10UA) IN VOLTS: VS DOSE

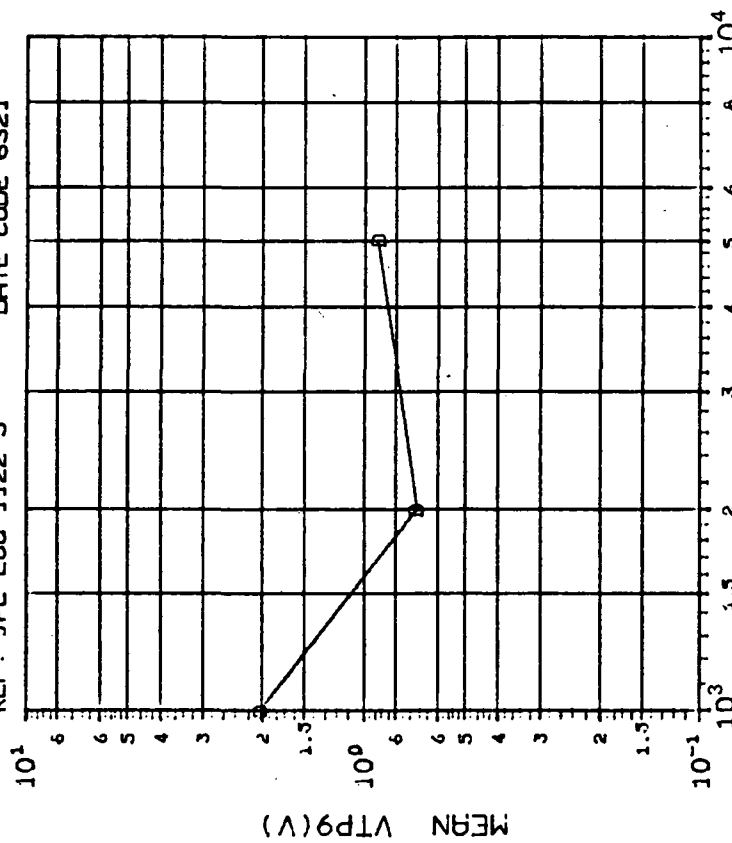
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 1 | 2 |
| C | 1.801 | .0252 .0337 |

INITIAL MEAN VALUE VTP8(V) = 1.86X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F

MFG: SSS 5 DEVICES TEST DATE 3-19-85

REF: JPL LOG 1122-3 DATE CODE 8321

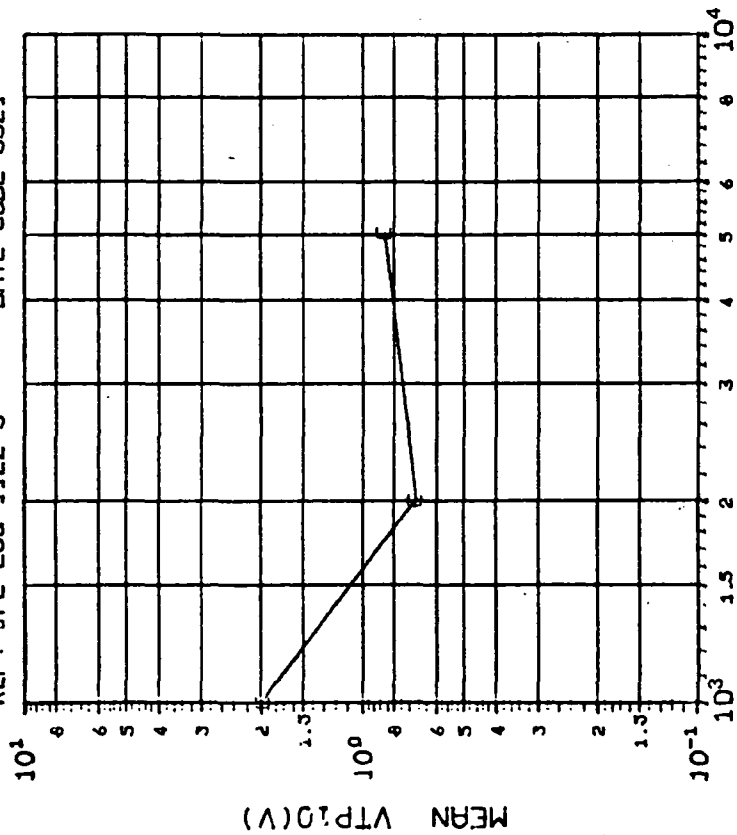


(16)VTP9 (ITP=+10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 1 | 2 |
| D | 1.903 | .0200 .0359 |

INITIAL MEAN VALUE VTP9(V) = 1.67X10⁺⁰

DEVICE TYPE: CD4013 DUAL DF/F
MFG: SSS 5 DEVICES TEST DATE 3-19-85
REF: JPL LOG 1122-3 DATE CODE 6321

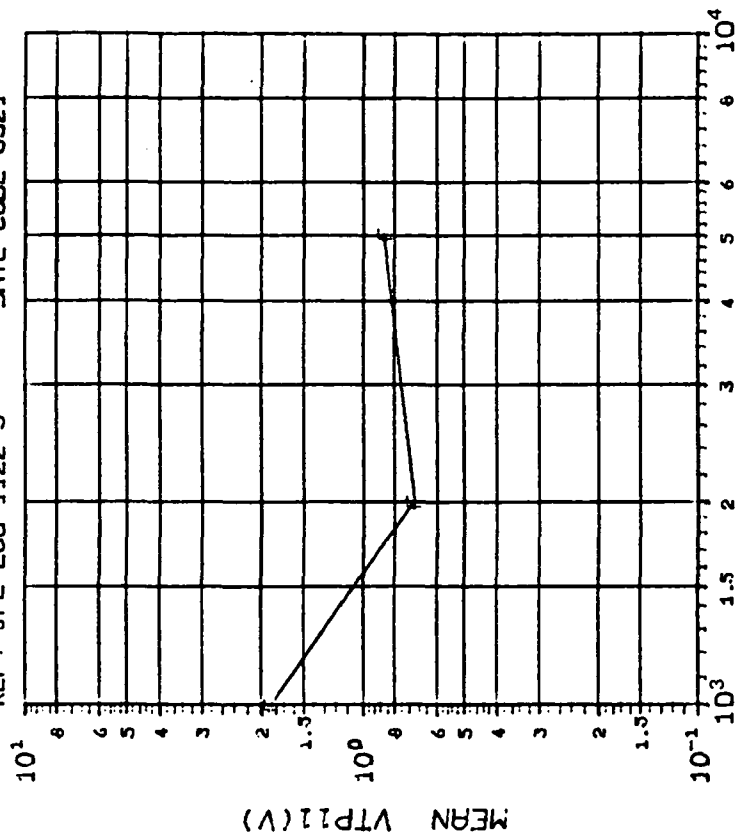


(17)VTP10(ITP=+10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| E | 1 | 2 |
| | 1.476 | .0200 |
| | .0350 | |

INITIAL MEAN VALUE VTP10(V) = $1.64 \times 10^{+0}$

DEVICE TYPE: CD4013 DUAL DF/F
MFG: SSS 5 DEVICES TEST DATE 3-19-85
REF: JPL LOG 1122-3 DATE CODE 6321



(18)VTP11(ITP=+10UA) IN VOLTS: VS DOSE

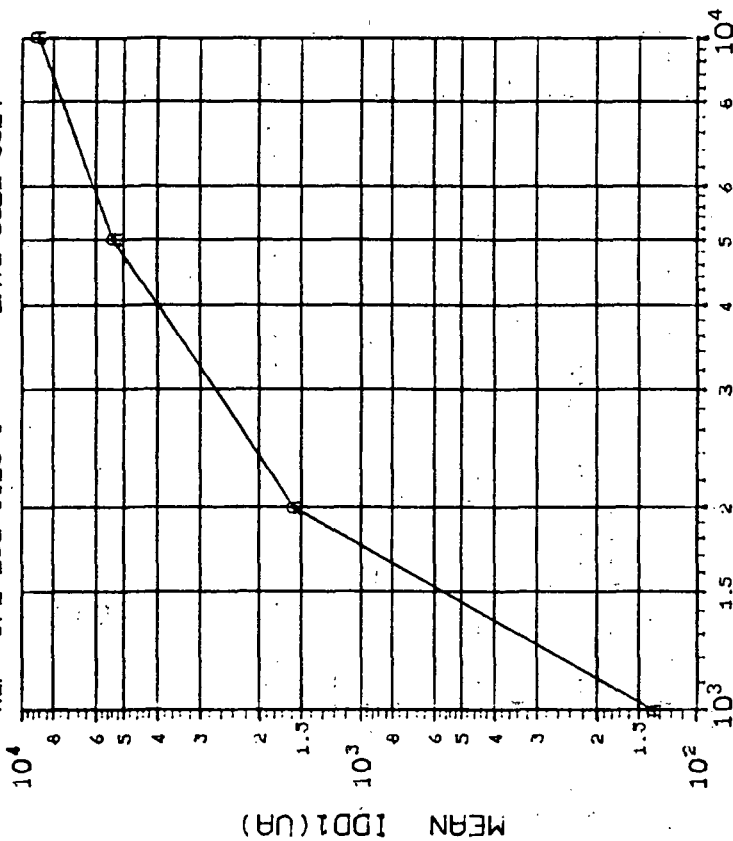
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| F | 1 | 2 |
| | 1.414 | .0200 |
| | .0271 | |

INITIAL MEAN VALUE VTP11(V) = $1.64 \times 10^{+0}$

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC

MFG: SSS 5 DEVICES TEST DATE 3-6-85

REF: JPL LOG 1123-1 DATE CODE 8327



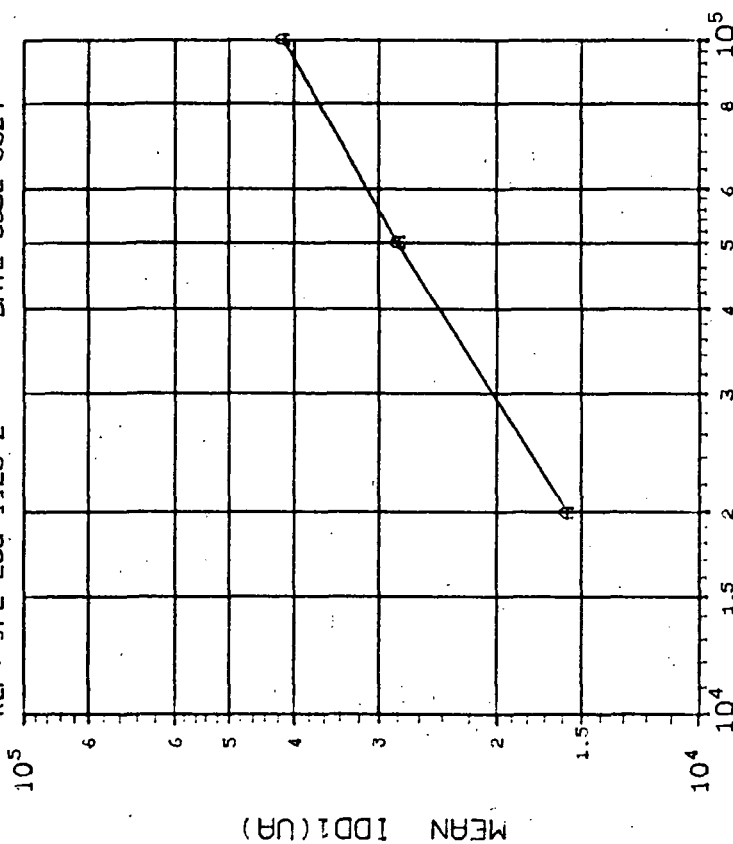
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 1 2 3 10 18.51 102.5 158.1 244.9 |

INITIAL MEAN VALUE $IDD1(UA) = 3.16 \times 10^{-3}$

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC

MFG: SSS 5 DEVICES TEST DATE 3-6-85

REF: JPL LOG 1123-2 DATE CODE 8327



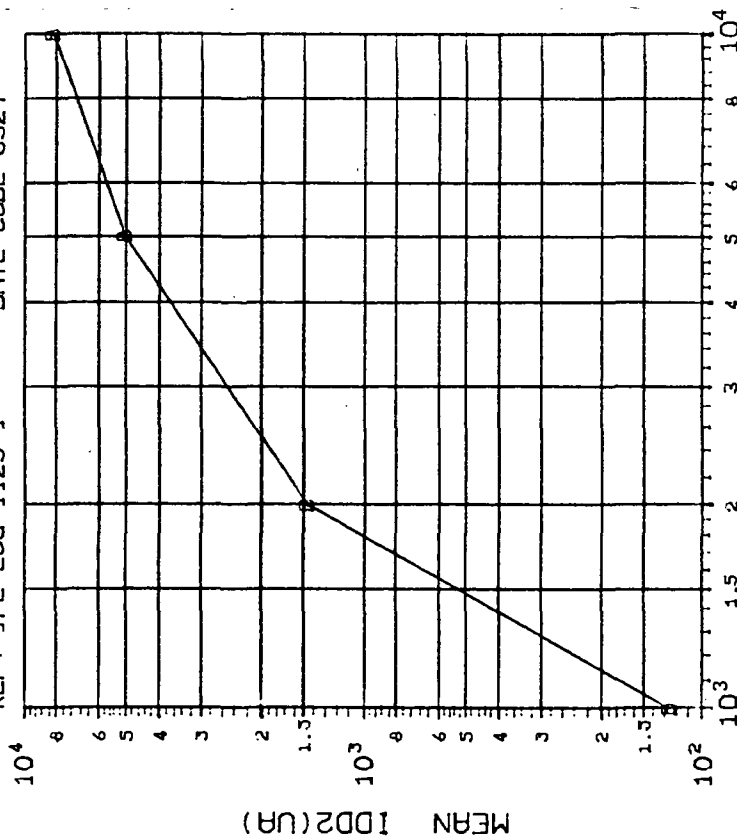
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 20 50 100 736.2 894.4 1949. |

INITIAL MEAN VALUE $IDD1(UA) = 3.16 \times 10^{-3}$

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC

MFG:SSS 5 DEVICES TEST DATE 3-6-85

REF: JPL LOG 1123-1 DATE CODE 8327



DOSE, rads(Si) Co 60 Gammas

(2)IDD2 (VDD=15V) IN UA: VS DOSE

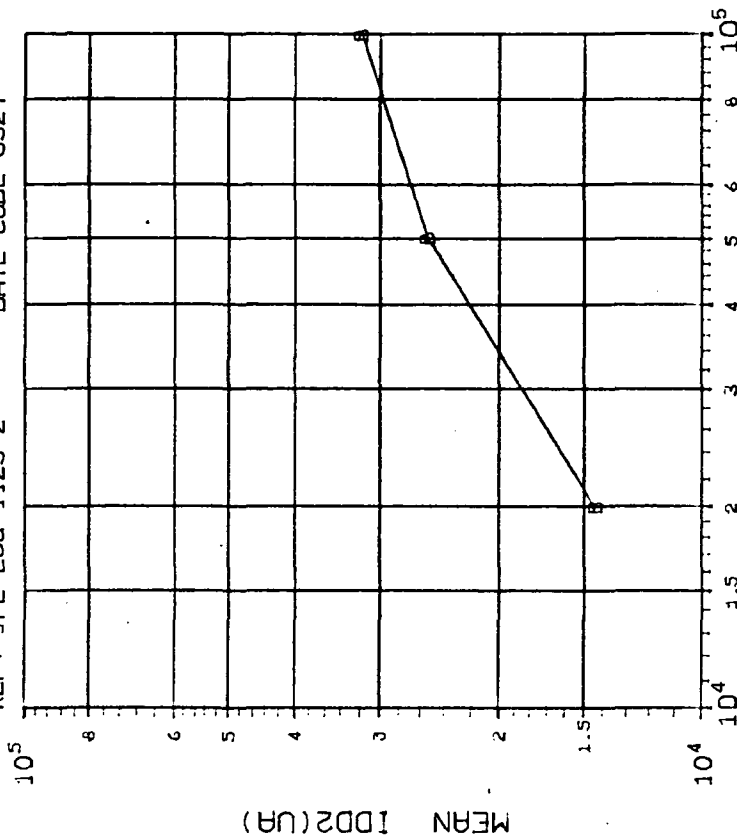
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 1 | 2 | 5 | 10 |
| B | 17.18 | 107.6 | 192.4 | 255.0 |

INITIAL MEAN VALUE IDD2(UA) = 3.88×10^{-3}

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC

MFG:SSS 5 DEVICES TEST DATE 3-6-85

REF: JPL LOG 1123-2 DATE CODE 8327

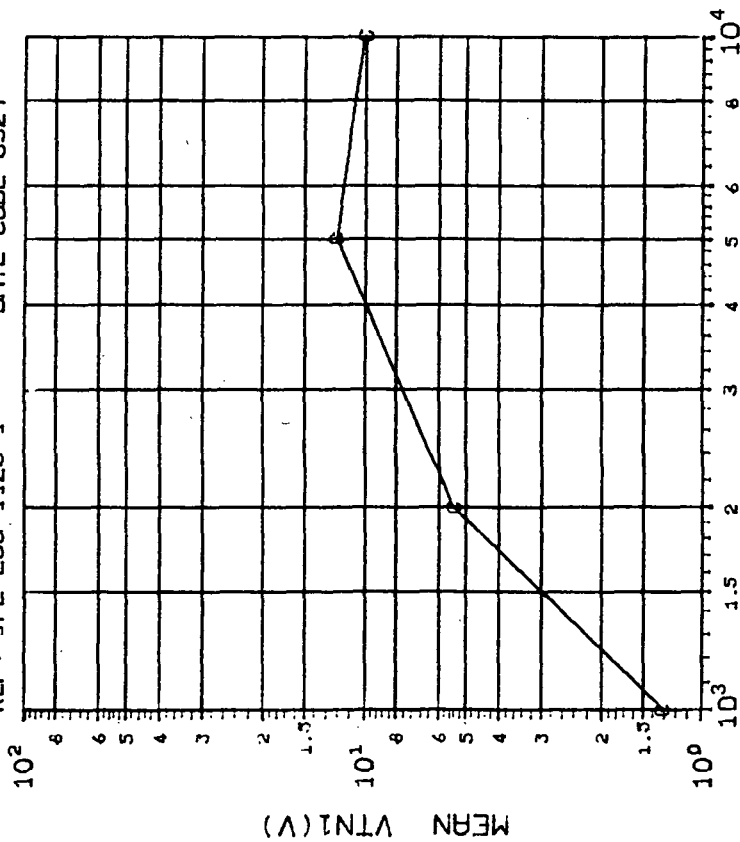


DOSE, rads(Si) Co 60 Gammas

(2) (VDD2=15V) IN UA: VS DOSE

INITIAL MEAN VALUE IDD2(UA) = 3.88×10^{-3}

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
MFG: SSS 5 DEVICES TEST DATE 3-6-85
REF: JPL LOG 1123-1 DATE CODE 8327



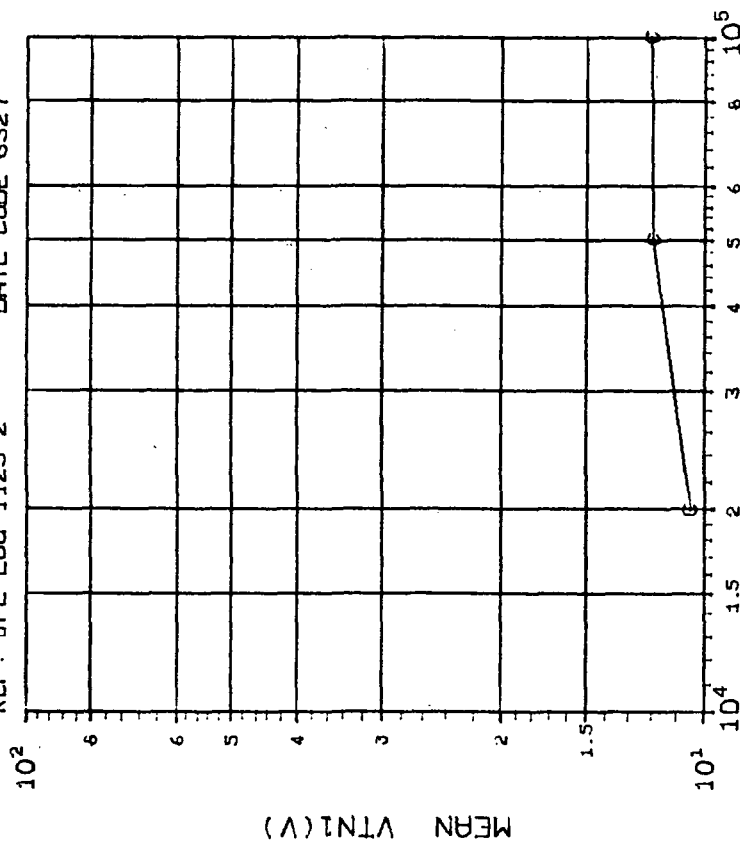
DOSE, rads(Si) Co 60 Gammas

(3)VTNI (ITN1=-10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 1 |
| | 2 |
| | 5 |
| | 10 |
| | .2063 .2713 .1320 3.140 |

INITIAL MEAN VALUE VTNI(V) = 1.57×10^{-9}

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
MFG: SSS 5 DEVICES TEST DATE 3-6-85
REF: JPL LOG 1123-2 DATE CODE 8327



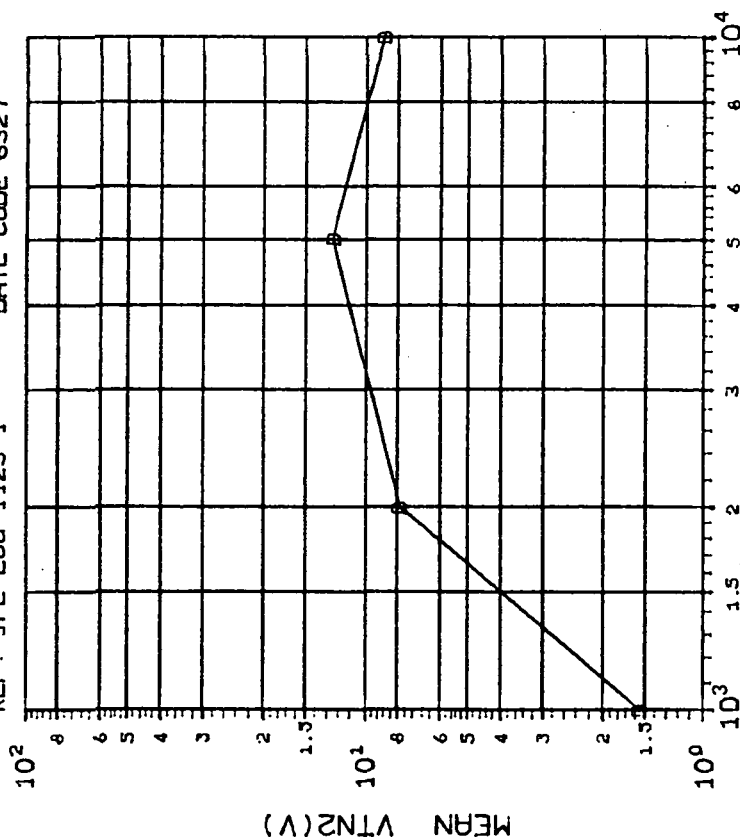
DOSE, rads(Si) Co 60 Gammas

(3) (ITN1=-10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 20 |
| | 50 |
| | 100 |
| | 2.252 .1623 .0950 |

INITIAL MEAN VALUE VTNI(V) = 1.57×10^{-9}

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
MFG:SSS 5 DEVICES TEST DATE 3-6-85
REF: JPL LOG 1123-1 DATE CODE 8327



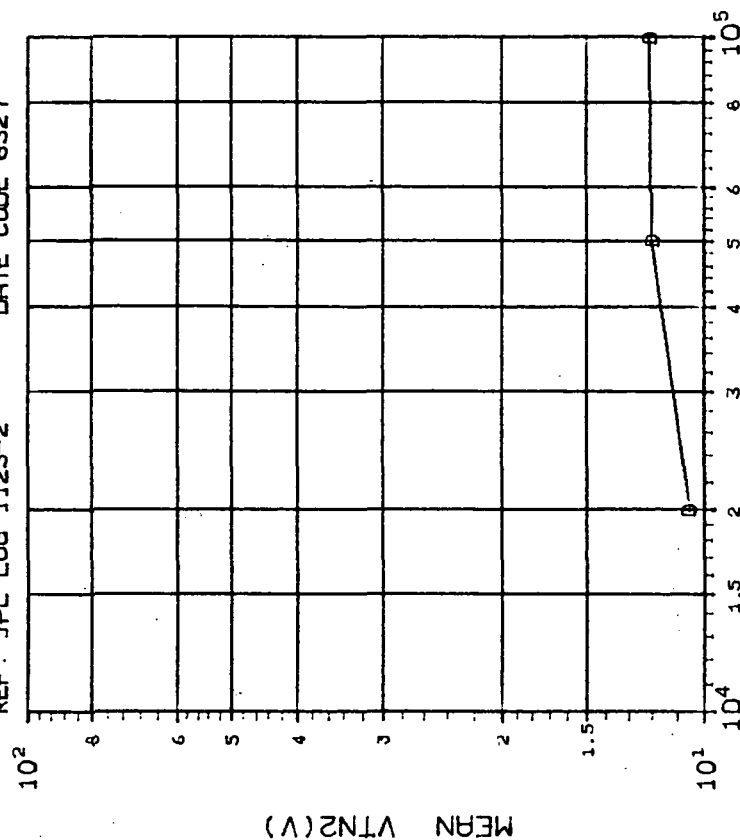
DOSE, rads(Si) Co 60 Gammas

(4)VTN2 (ITN2=-10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 1 2 5 10 |
| | .1910 .5325 .0219 3.194 |

INITIAL MEAN VALUE VTN2(V) = 1.77×10^{-9}

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
MFG:SSS 5 DEVICES TEST DATE 3-6-85
REF: JPL LOG 1123-2 DATE CODE 8327



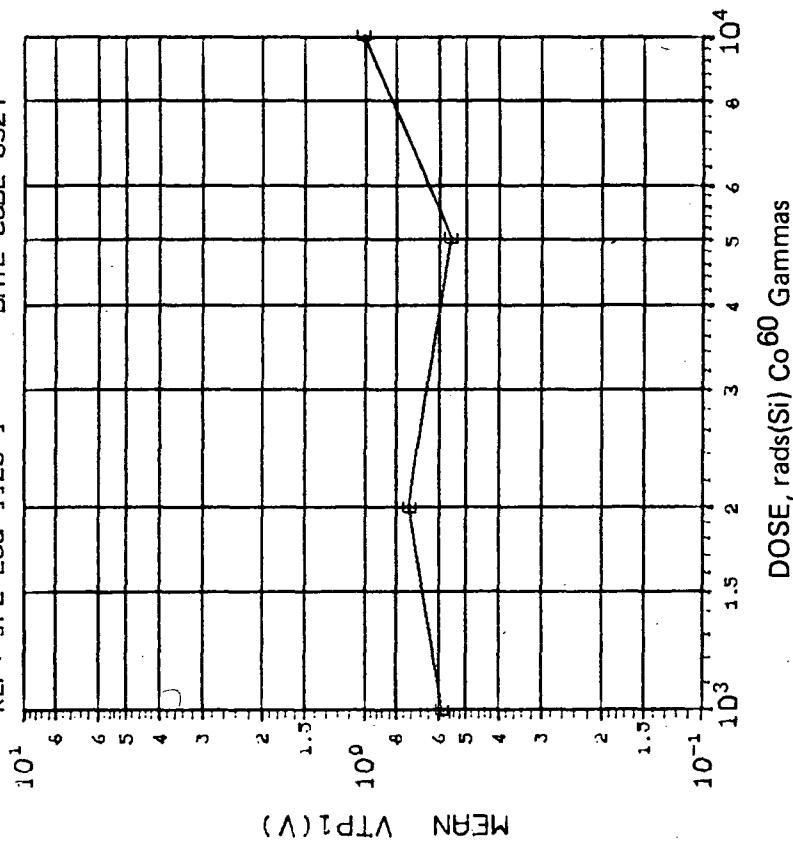
DOSE, rads(Si) Co 60 Gammas

(4)VTN2 (ITN2=-10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 20 50 100 |
| | 2.371 .1066 .1354 |

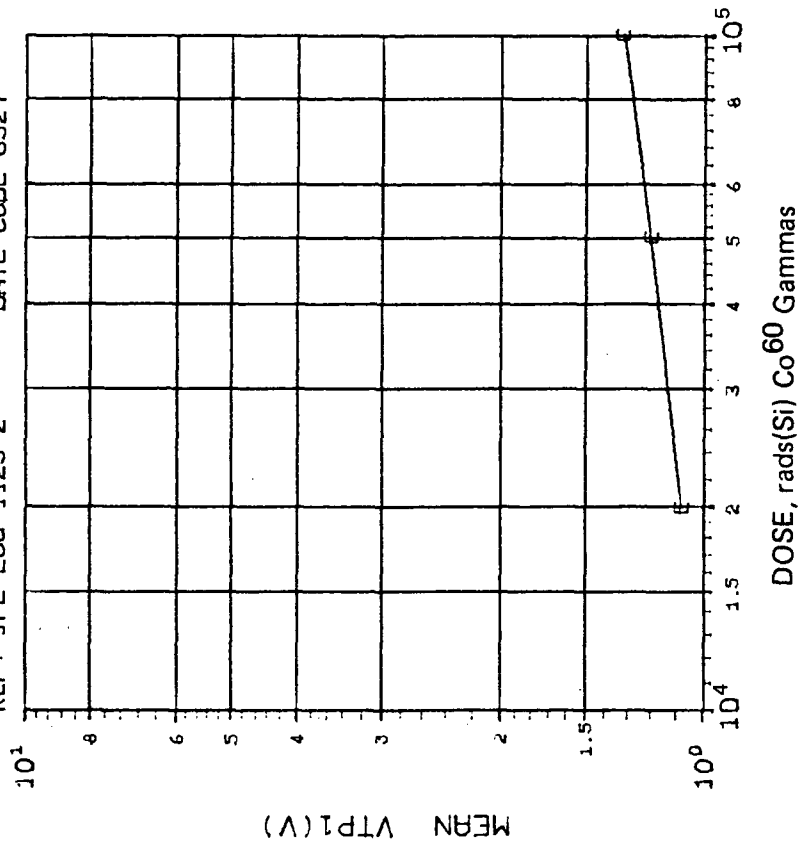
INITIAL MEAN VALUE VTN2(V) = 1.77×10^{-9}

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
MFG:SSS 5 DEVICES TEST DATE 3-6-85
REF: JPL LOG 1123-1 DATE CODE 8327



(5) VTP1 (JTP1=+10UA) IN VOLTS: VS DOSE
INITIAL MEAN VALUE VTP1(V) = 1.54X10⁻⁰

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
MFG:SSS 5 DEVICES TEST DATE 3-6-85
REF: JPL LOG 1123-2 DATE CODE 8327

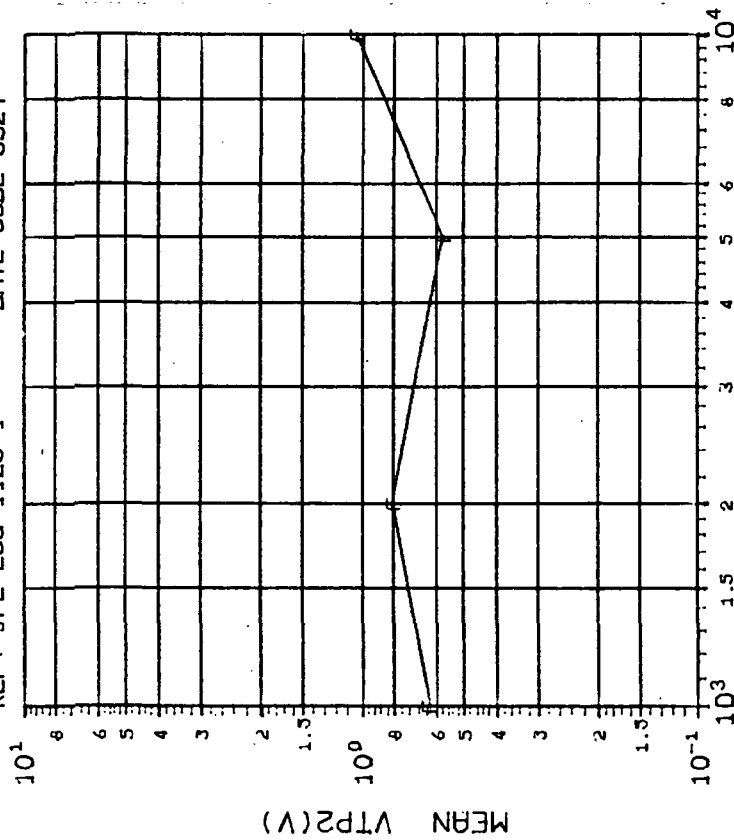


(5) (JTP1=+10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 20 |
| | 50 |
| | 100 |
| | .0336 .0862 .0089 |

INITIAL MEAN VALUE VTP1(V) = 1.54X10⁻⁰

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
 MFG: SSS 5 DEVICES TEST DATE 3-6-85
 REF: JPL LOG 1123-1 DATE CODE 8327

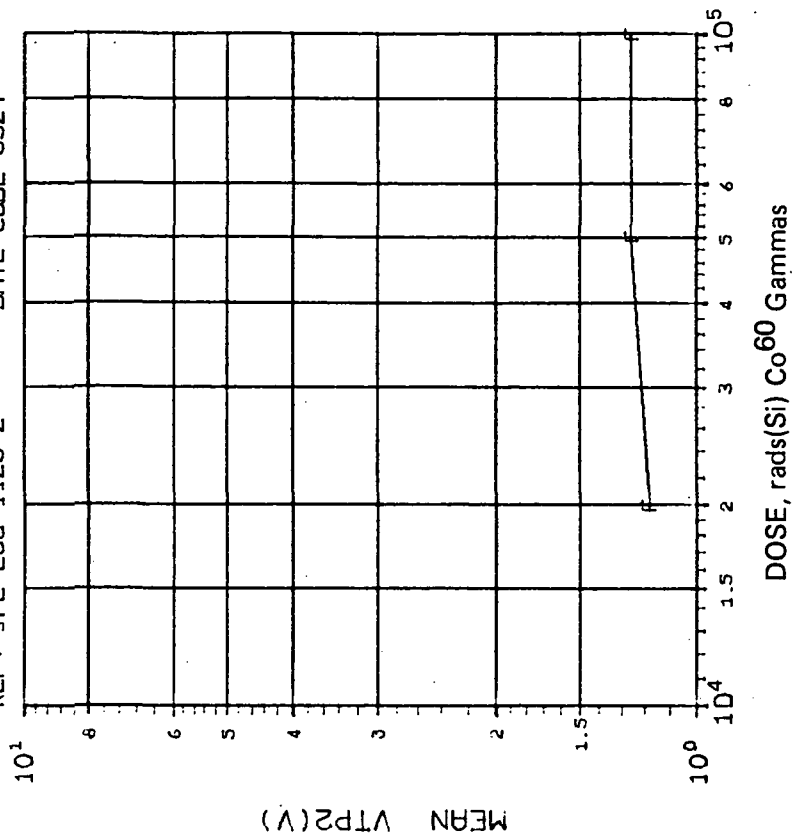


(6) VTP2 (ITP2=+10UA) IN VOLTS: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 1 | 2 |
| F | .0134 | .0134 |
| | .8598 | .0055 |

INITIAL MEAN VALUE VTP2(V) = 1.71X10⁻⁹

DEVICE TYPE: CD4060 COUNTER/DIVIDE/OSC
 MFG: SSS 5 DEVICES TEST DATE 3-6-85
 REF: JPL LOG 1123-2 DATE CODE 8327



(6) (ITP2=+10UA) IN VOLTS: VS DOSE

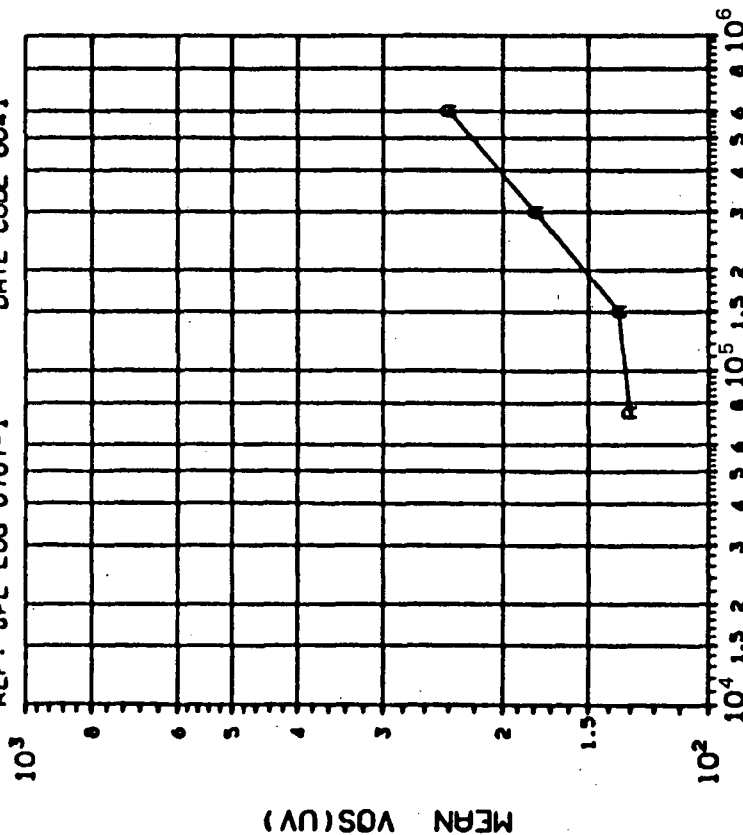
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 20 | 50 |
| F | .0195 | .0045 |
| | .0045 | .0045 |

INITIAL MEAN VALUE VTP2(V) = 1.71X10⁻⁹

DEVICE TYPE: CMP05 COMPARATOR

MFG: PMI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-1 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(1) VOS(UV): VS DOSE

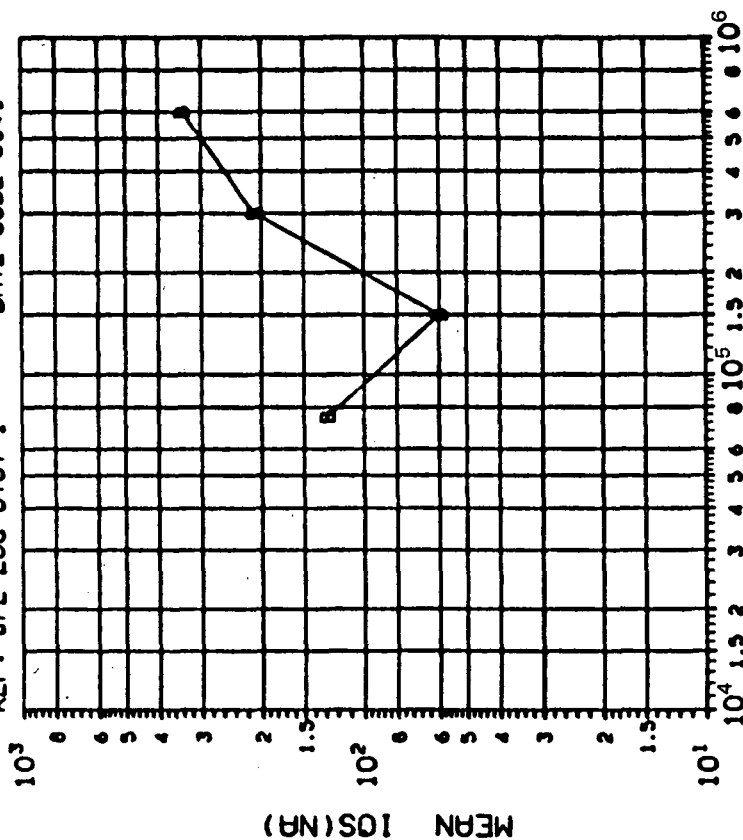
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| A | 600 |
| | 150.9 |
| | 145.4 |
| A | 190.0 |
| | 240.7 |

INITIAL MEAN VALUE VOS(UV) = 9.61×10^{-1}

DEVICE TYPE: CMP05 COMPARATOR

MFG: PMI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-1 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(2) IOS(NR): VS DOSE

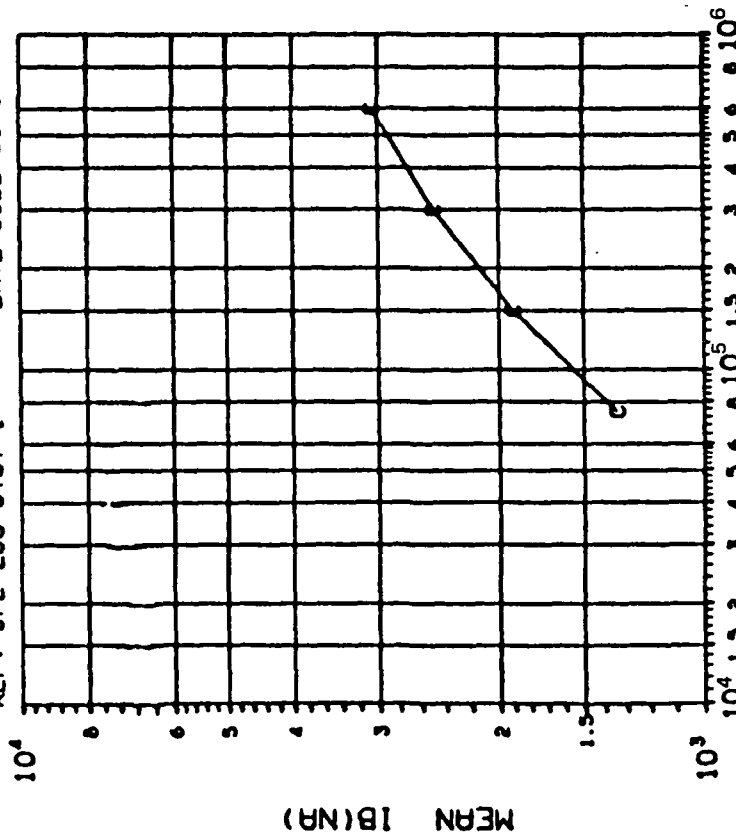
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| B | 600 |
| | 56.09 |
| | 133.2 |
| B | 199.4 |
| | 275.1 |

INITIAL MEAN VALUE IOS(NR) = 2.56×10^{-1}

DEVICE TYPE: CMOS COMPARATOR

MFG: PMI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-1 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(3) IB(NA): VS DOSE

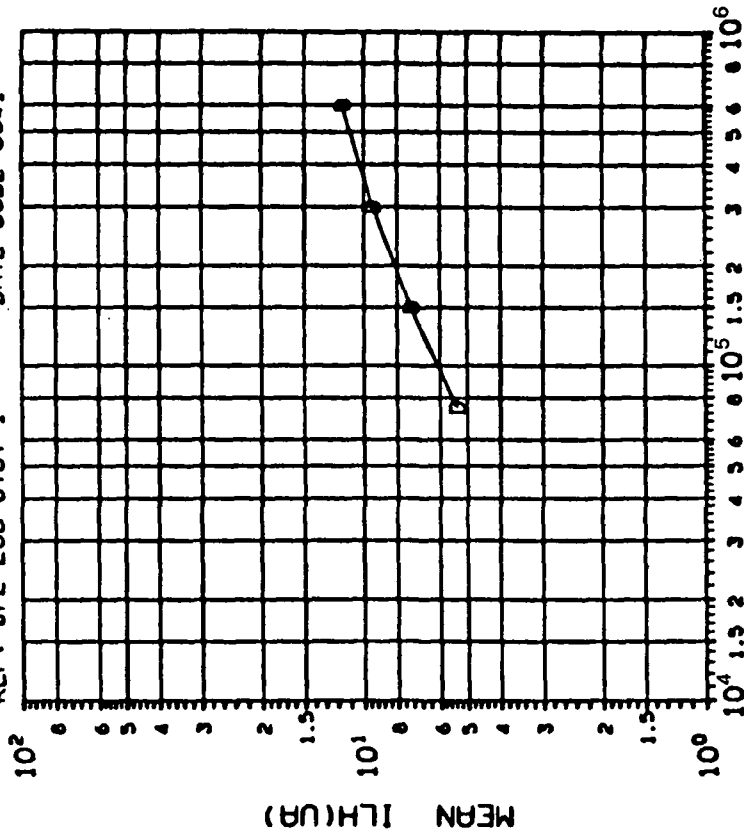
| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|------|
| | 75 | 150 | 300 | 600 |
| C | 372.4 | 608.2 | 913.4 | 1188 |

INITIAL MEAN VALUE IB(NA) = 6.31×10^3

DEVICE TYPE: CMOS COMPARATOR

MFG: PMI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-1 DATE CODE 8041



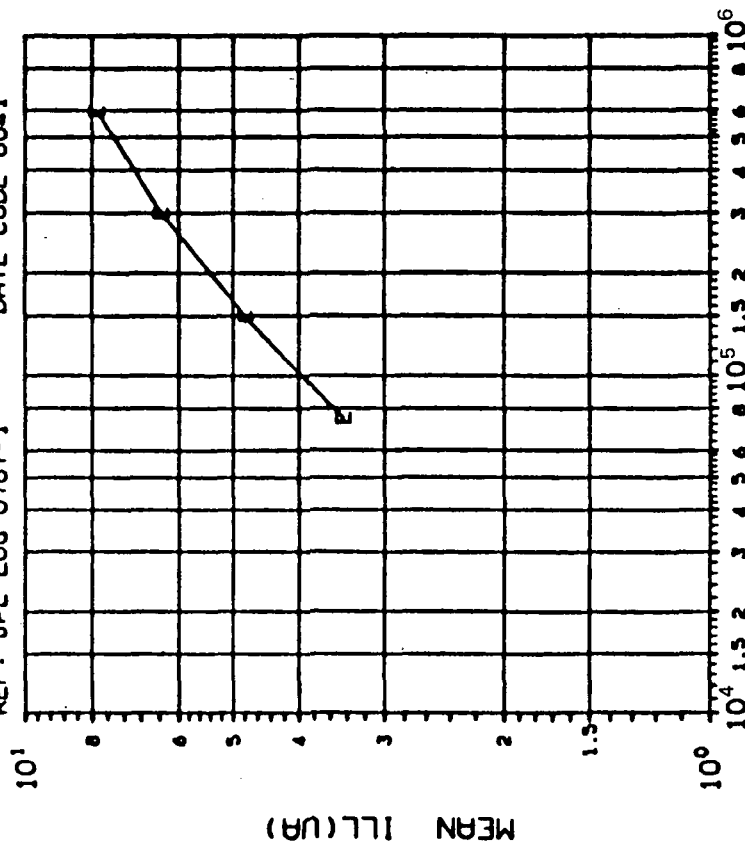
DOSE, rads(Si) 2.5 MeV electrons

(4) ILH(UA) LATCH ENABLE HI: VS DOSE

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------|
| | 75 | 150 | 300 | 600 |
| D | 1.523 | 2.464 | 3.551 | 4.584 |

INITIAL MEAN VALUE ILH(UA) = 2.46×10^0

DEVICE TYPE: CMOS COMPARATOR
 MFG: PMI 6 DEVICES TEST DATE 9-14-81
 REF: JPL LOG 0767-1 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(5) ILL(UA) LATCH ENABLE L0: VS DOSE

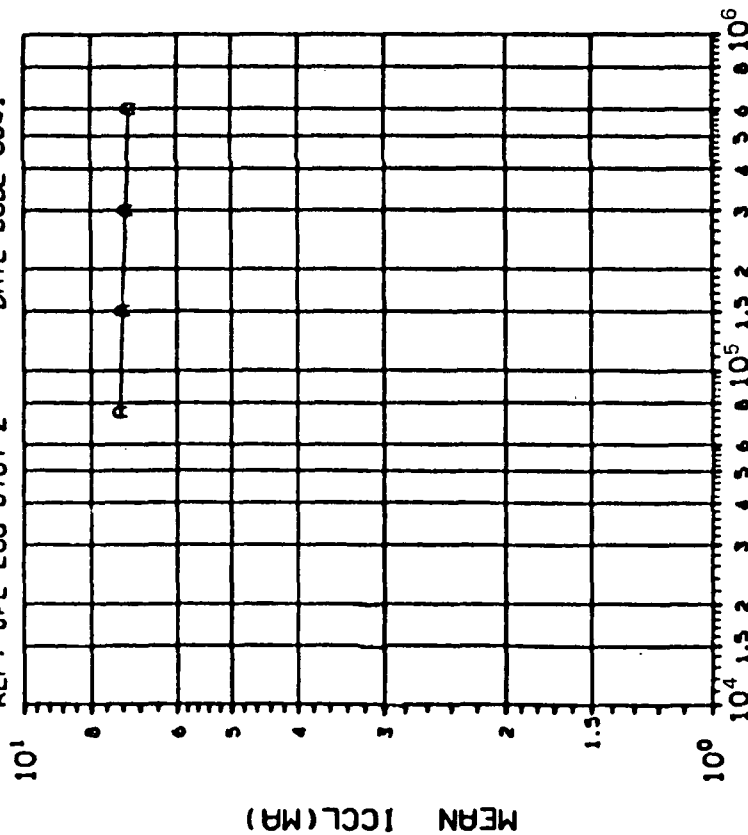
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 150 300 600 |
| E | 1.046 1.704 2.510 3.250 |

INITIAL MEAN VALUE ILL(UA) = 1.52×10^{-6}

DEVICE TYPE: CMPOS COMPARATOR

MFG: PMI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-2 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(1) ICCL OUTPUT LO(VCC=5.0V)MA: VS DOSE

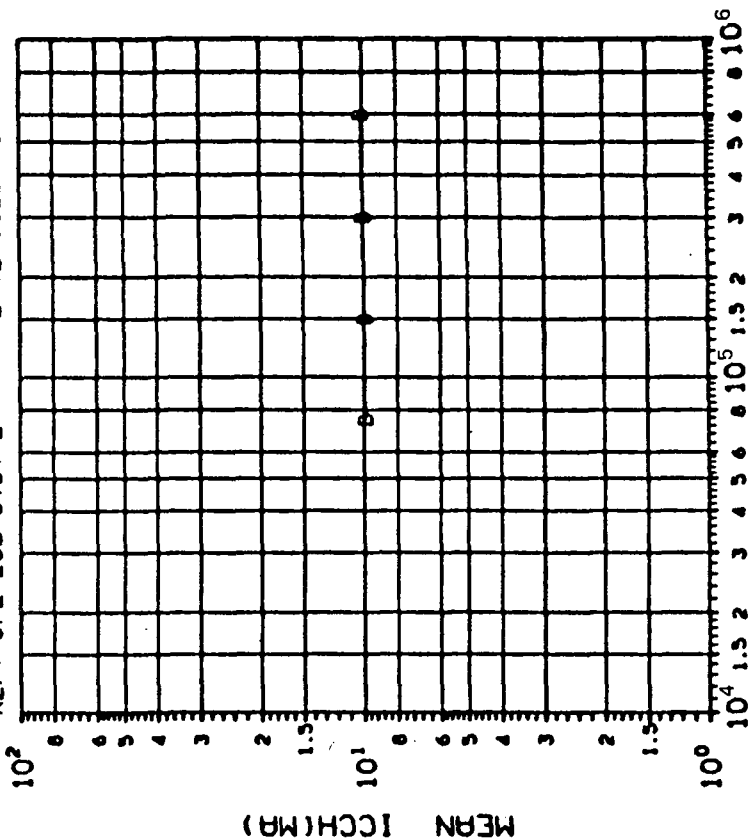
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| .4372 .4256 .4261 .4306 | |

INITIAL MEAN VALUE ICCL(MA) = 7.33X10⁺⁰

DEVICE TYPE: CMPOS COMPARATOR

MFG: PMI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-2 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(2) ICCH OUTPUT HI(VCC=5.0V)MA: VS DOSE

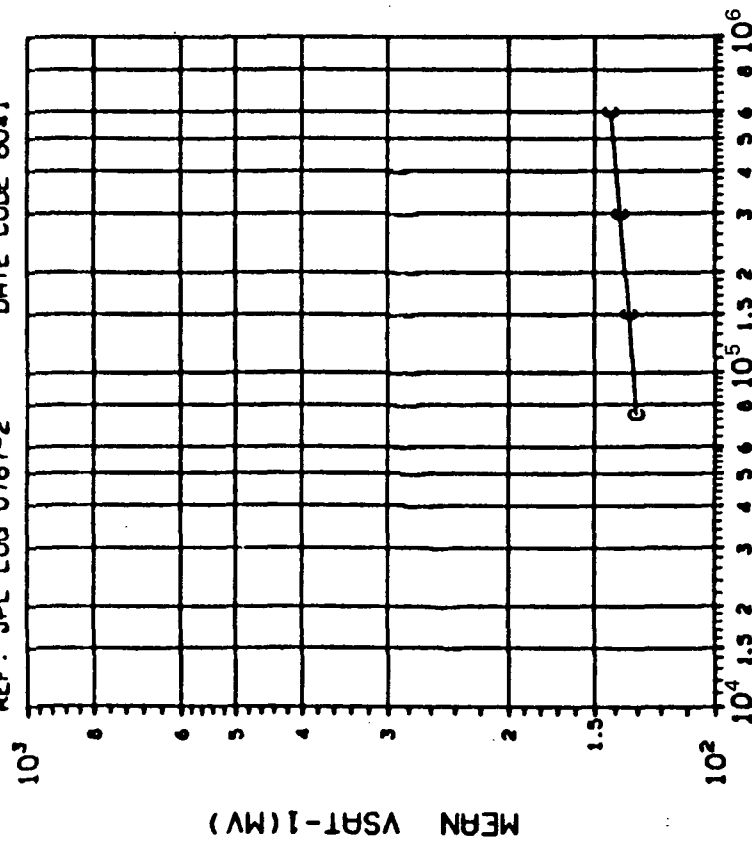
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| .5923 .5612 .5630 .5733 | |

INITIAL MEAN VALUE ICCH(MA) = 9.92X10⁺⁰

DEVICE TYPE: CMOS COMPARATOR

MFG: PHI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-2 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(3)VSAT-1(10=0MA)MV: VS DOSE

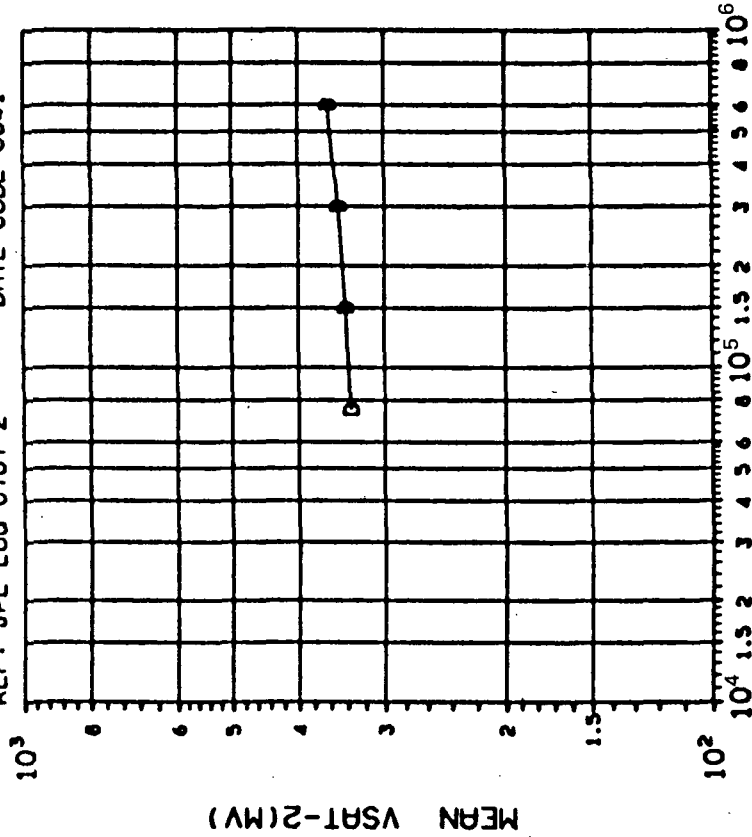
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| C | 600 |
| | 1.862 |
| | 1.673 |

INITIAL MEAN VALUE VSAT-1(MV) = 1.29X10⁻²

DEVICE TYPE: CMOS COMPARATOR

MFG: PHI 6 DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-2 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(4)VSAT-2(10=12.8MA)MV: VS DOSE

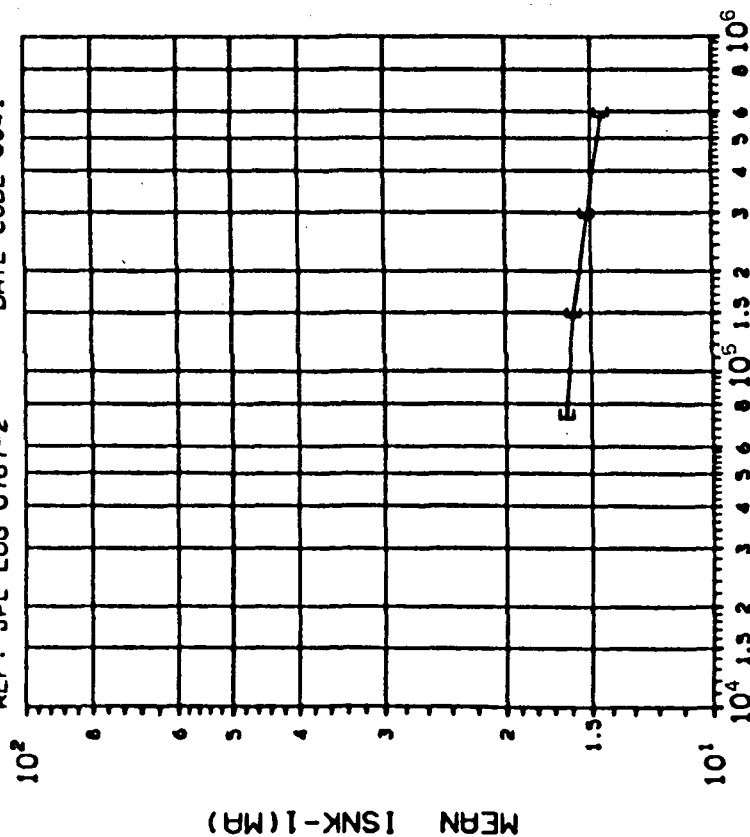
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| D | 600 |
| | 7.481 |
| | 7.088 |

INITIAL MEAN VALUE VSAT-2(MV) = 3.33X10⁻²

DEVICE TYPE: CMOS COMPARATOR

MFG: PMI 6-DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-2 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(5) ISNK-1(V0=0.4V)MA: VS DOSE

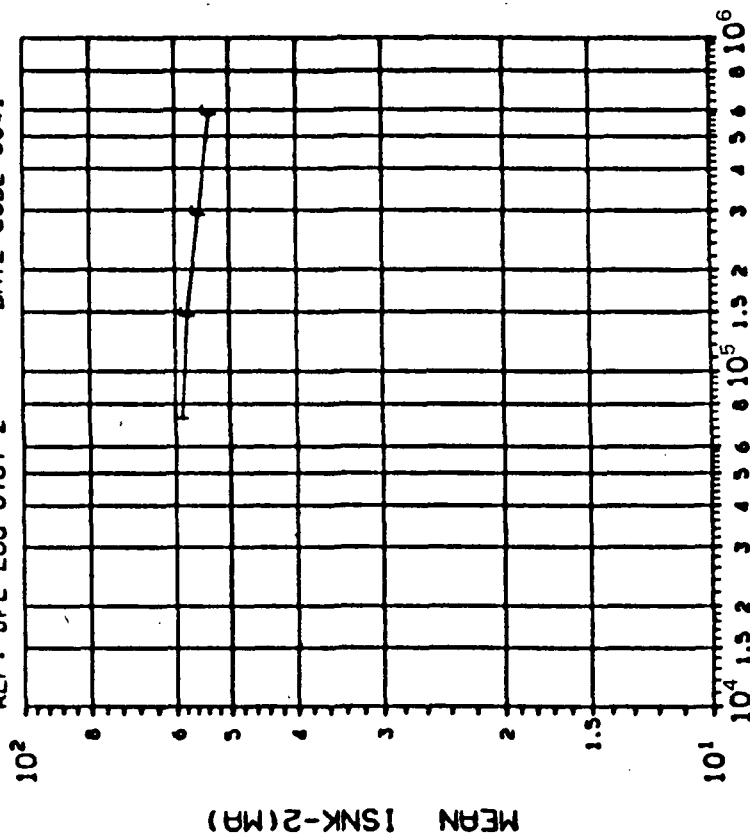
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| E | 75 |
| | 150 |
| | 300 |
| E | 600 |
| | 1.290 |
| | .5642 |
| E | .6285 |

INITIAL MEAN VALUE ISNK-1(MA) = 1.66X10⁻¹¹

DEVICE TYPE: CMOS COMPARATOR

MFG: PMI 6-DEVICES TEST DATE 9-14-81

REF: JPL LOG 0767-2 DATE CODE 8041



DOSE, rads(Si) 2.5 MeV electrons

(6) ISNK-2(V0=1.5V)MA: VS DOSE

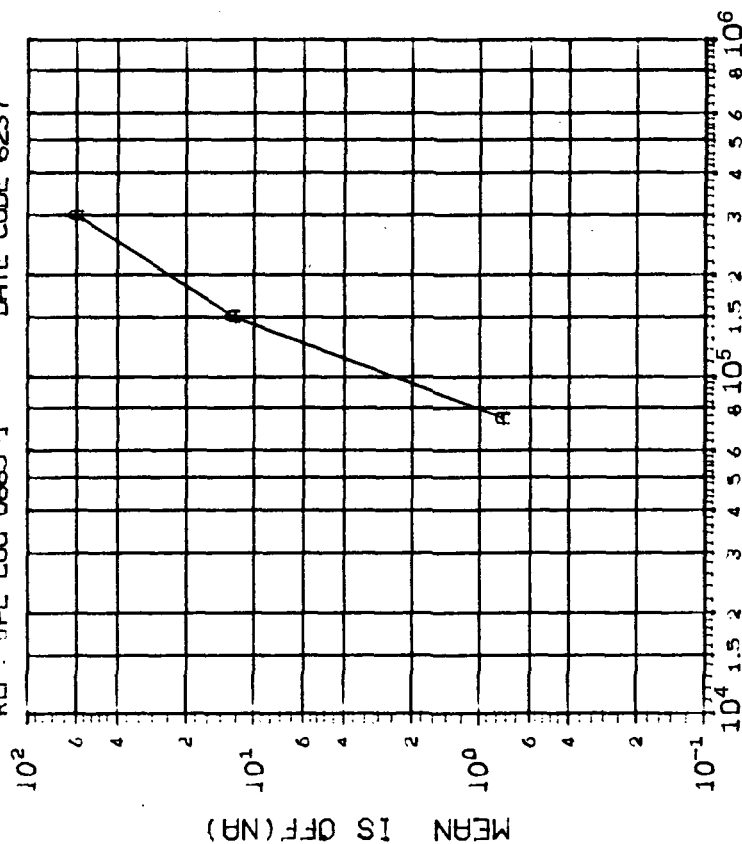
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| F | 75 |
| | 150 |
| | 300 |
| F | 600 |
| | 1.848 |
| | 1.674 |
| F | 1.780 |
| | 1.955 |

INITIAL MEAN VALUE ISNK-2(MA) = 3.94X10⁻¹¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0885-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(1) IS (OFF) VS ± 7.5 , $V_D = -7.5$ V IN NA: VS DOSE

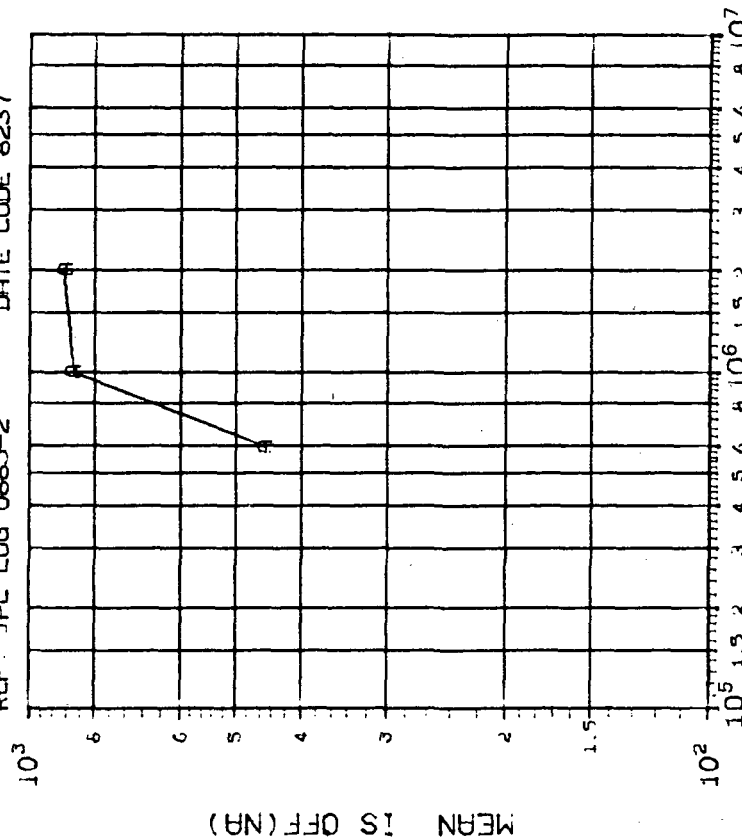
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| | .4754 13.68 68.97 |

INITIAL MEAN VALUE IS OFF (NA) = 6.66×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0885-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(1) IS (OFF) VS ± 7.5 , $V_D = -7.5$ V IN NA: VS DOSE

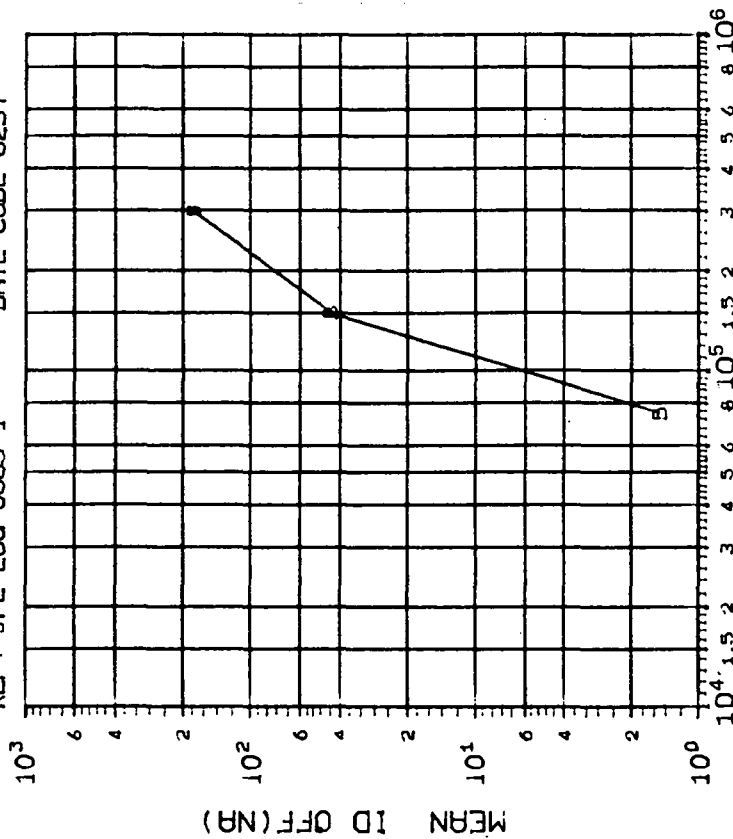
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| | 524.2 995.6 1027. |

INITIAL MEAN VALUE IS OFF (NA) = 6.66×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0885-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID (OFF) $V_D = +7.5$, $V_S = -7.5$ V IN NA: VS DOSE

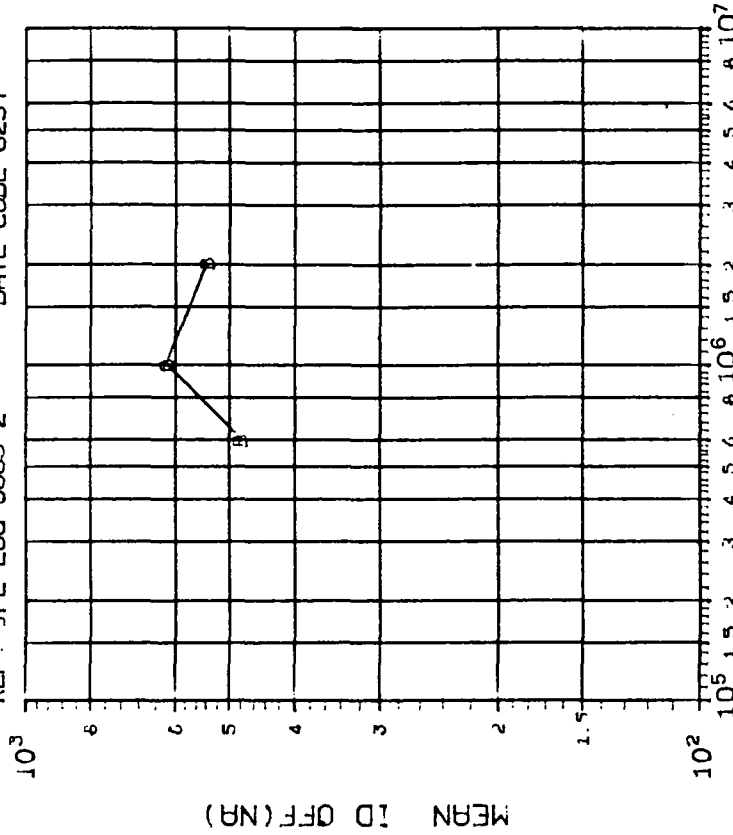
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 150 300 |
| | .7972 51.53 207.1 |

INITIAL MEAN VALUE ID OFF (NA) = 6.43×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0885-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID (OFF) $V_D = +7.5$, $V_S = -7.5$ V IN NA: VS DOSE

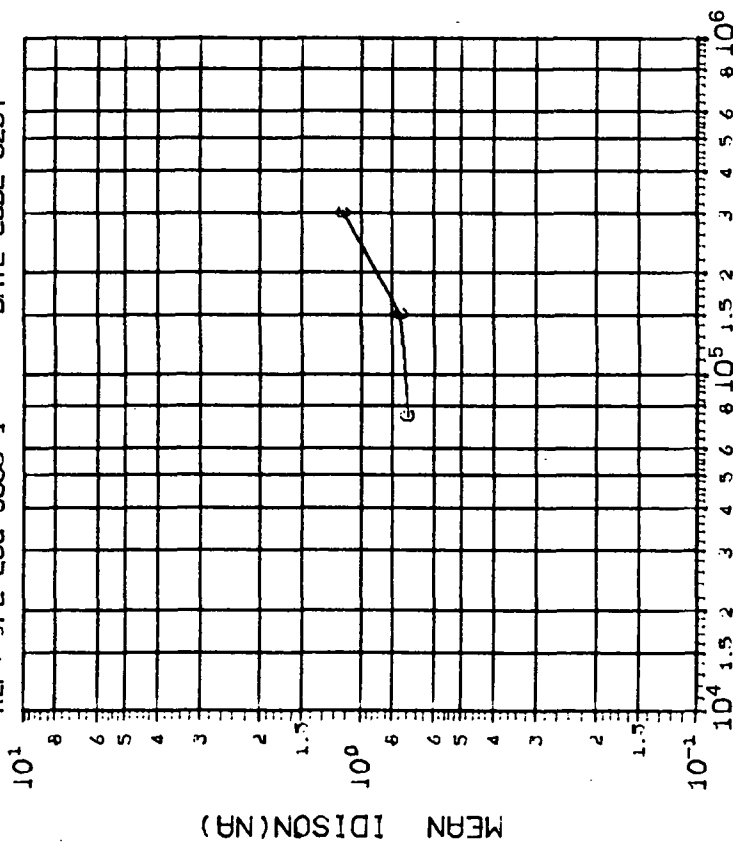
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 1000 2000 |
| | 554.0 715.5 622.9 |

INITIAL MEAN VALUE ID OFF (NA) = 6.43×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0865-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(3)ID (ON)+IS(ON) VD=VS=-7.5V IN NA VS DOSE

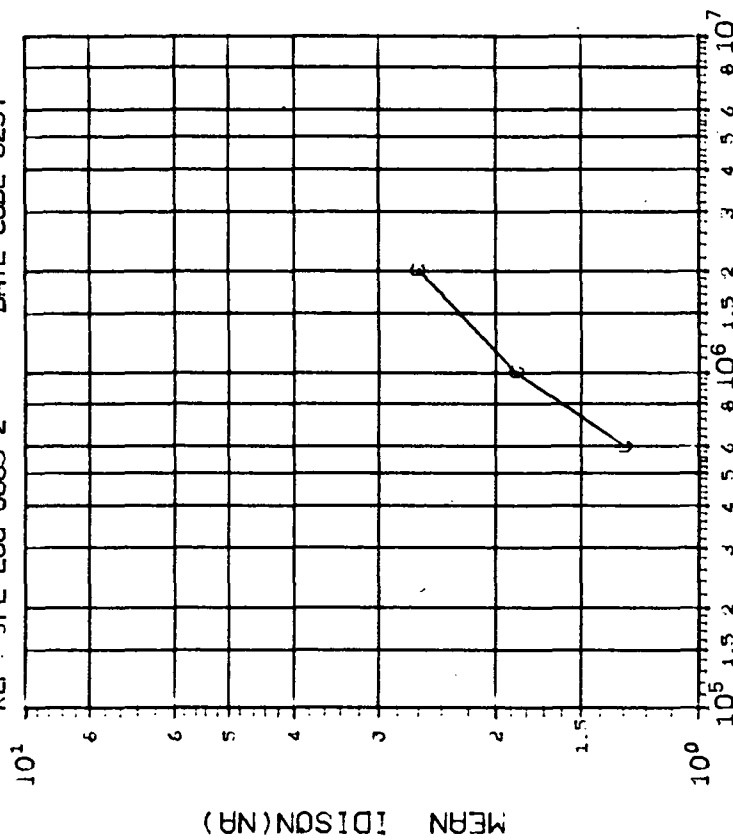
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 150 300 |
| | .3491 .4734 .5926 |

INITIAL MEAN VALUE IDISON(NA) = 2.06×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0865-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(3)ID (ON)+IS(ON) VD=VS=-7.5V IN NA VS DOSE

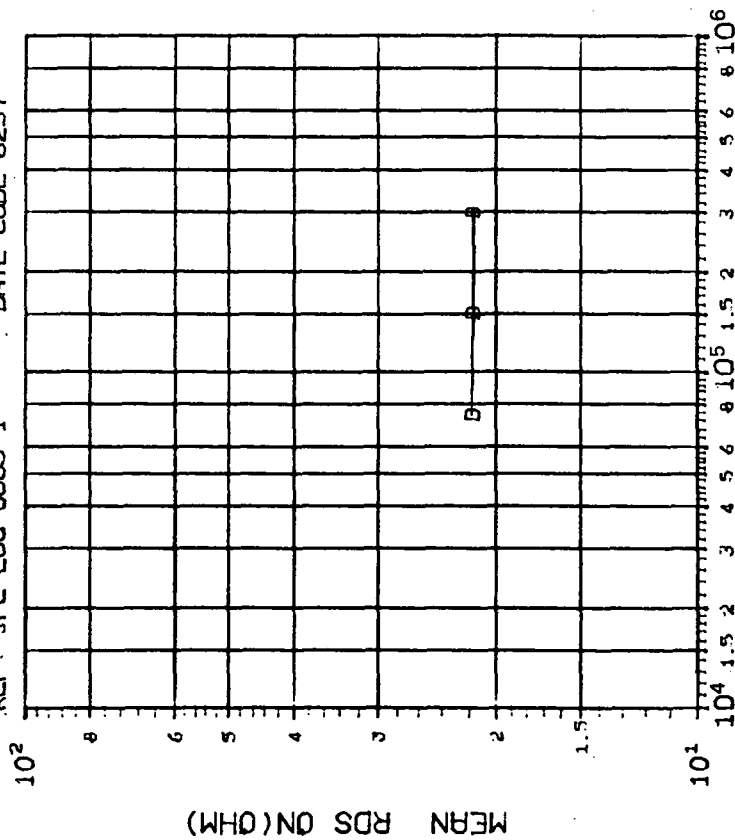
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 1000 2000 |
| | .7763 .9438 1.438 |

INITIAL MEAN VALUE IDISON(NA) = 2.06×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0885-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4) RDS (ON) VD=10V, IS=-10MA, VIN=2.5 VS DOSE

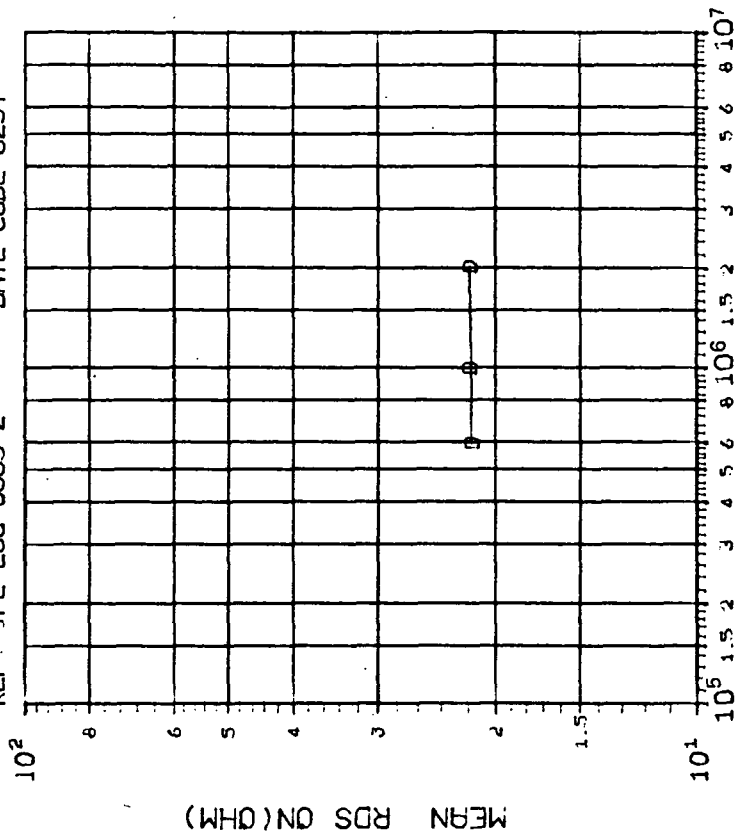
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 |
| D | 1.228 | 1.263 1.257 |

INITIAL MEAN VALUE RDS ON(OHM)= 2.16X10¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0885-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4) RDS (ON) VD=10V, IS=-10MA, VIN=2.5 VS DOSE

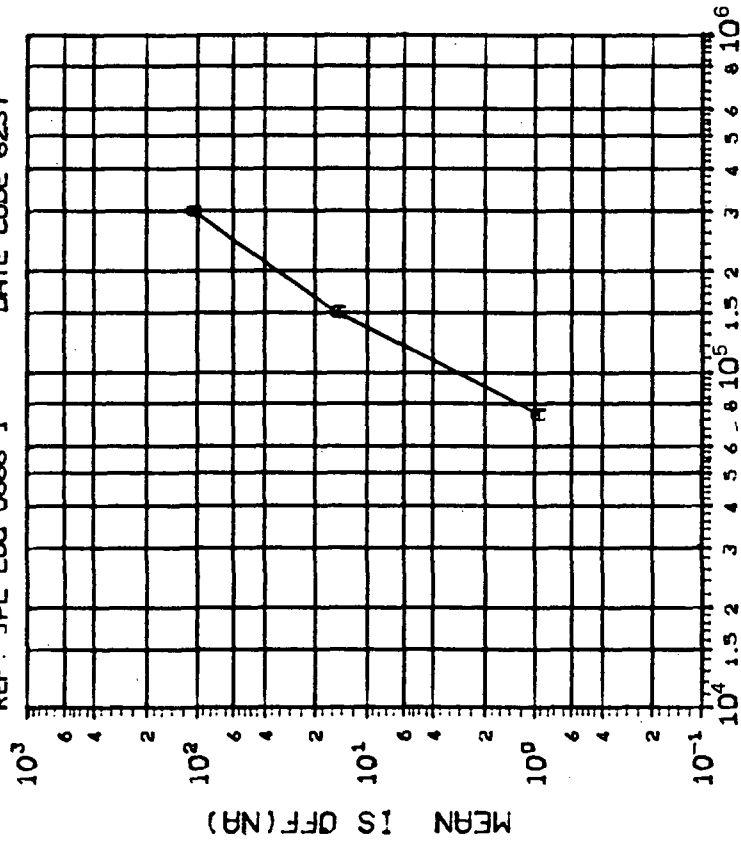
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 600 | 1000 2000 |
| D | 1.319 | 1.324 1.257 |

INITIAL MEAN VALUE RDS ON(OHM)= 2.16X10¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(111)S (OFF) VS=+7.5, VDE=-7.5V IN NA: VS DOSE

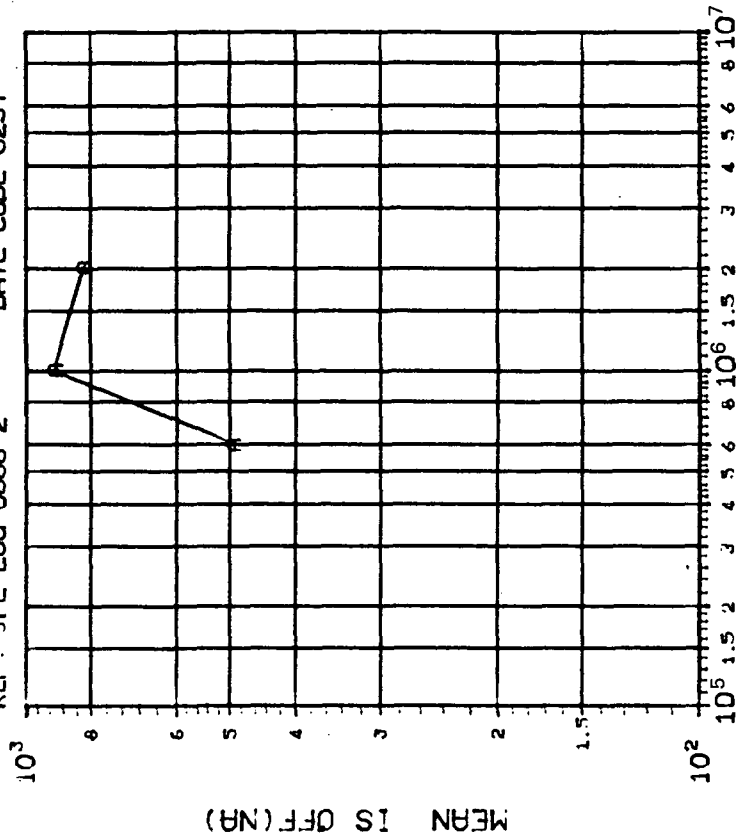
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| .1982 15.98 130.2 | |

INITIAL MEAN VALUE IS OFF(NA) = $1.68 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(111)S (OFF) VS=+7.5, VDE=-7.5V IN NA: VS DOSE

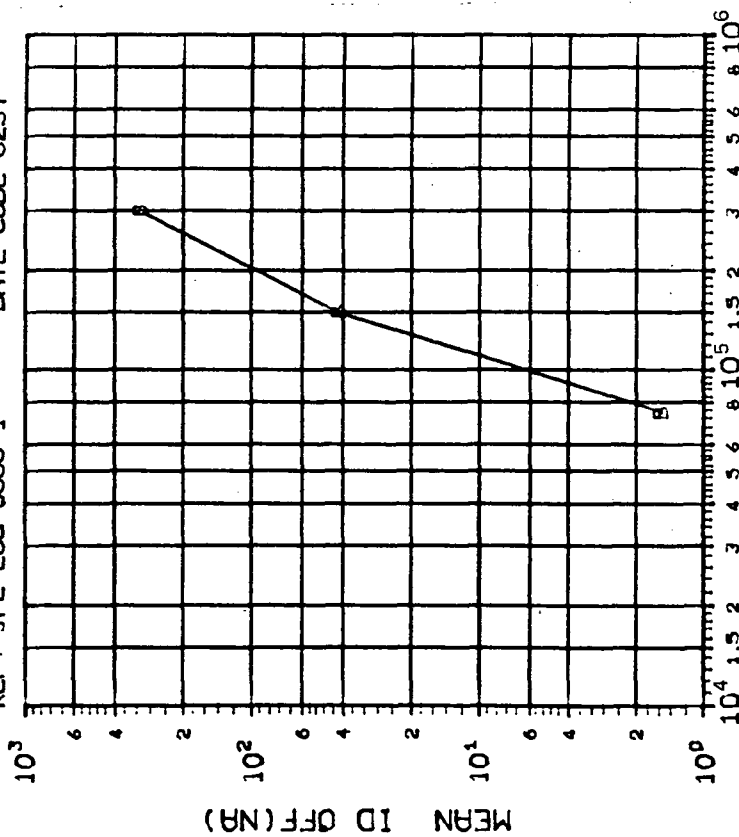
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| 586.9 1038. 950.6 | |

INITIAL MEAN VALUE IS OFF(NA) = $1.68 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID (OFF) $V_D = +7.5$, $V_S = -7.5$ V IN NA: VS DOSE

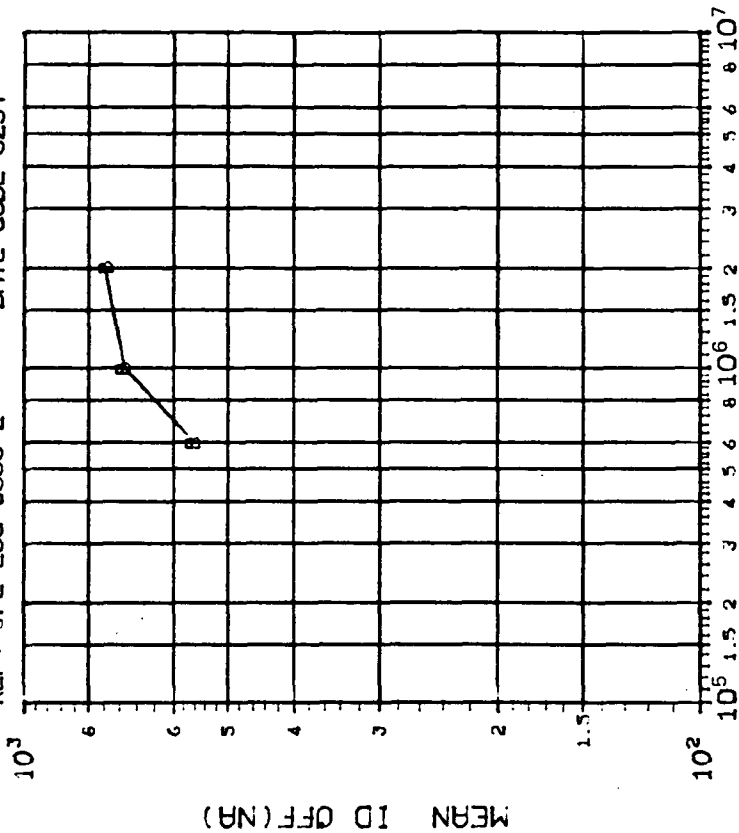
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| .4244 47.16 364.3 | |

INITIAL MEAN VALUE ID OFF (NA) = $1.91 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID (OFF) $V_D = +7.5$, $V_S = -7.5$ V IN NA: VS DOSE

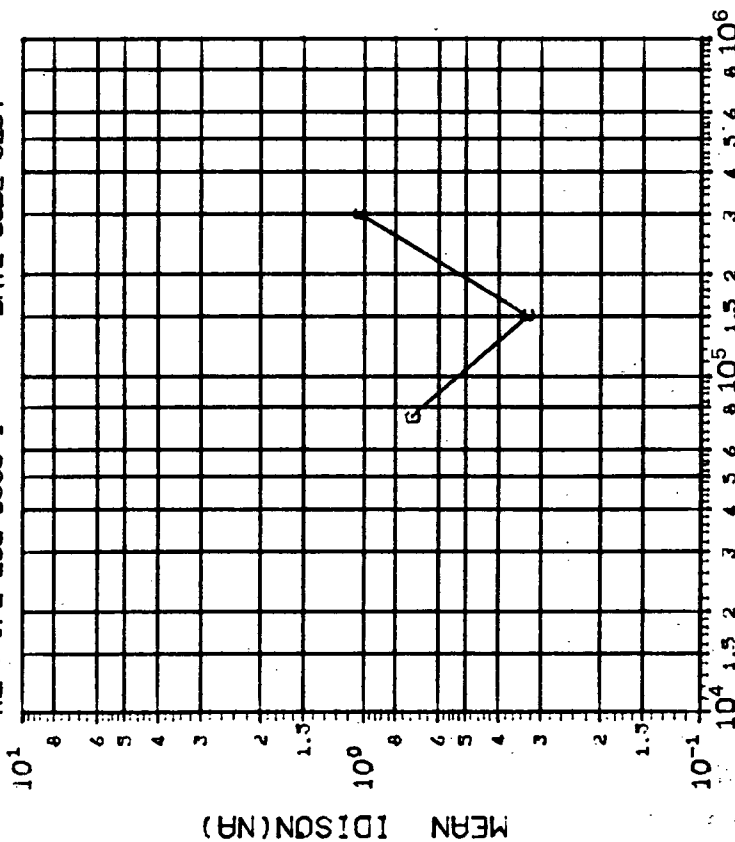
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 |
| | 1000 |
| | 2000 |
| 649.4 822.5 925.1 | |

INITIAL MEAN VALUE ID OFF (NA) = $1.91 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-1 DATE CODE 8237



DOSE, rad(Si) 2.5 MeV electrons

(3)ID (ON)+IS(ON) VD=VS=-7.5V IN NA VS DOSE

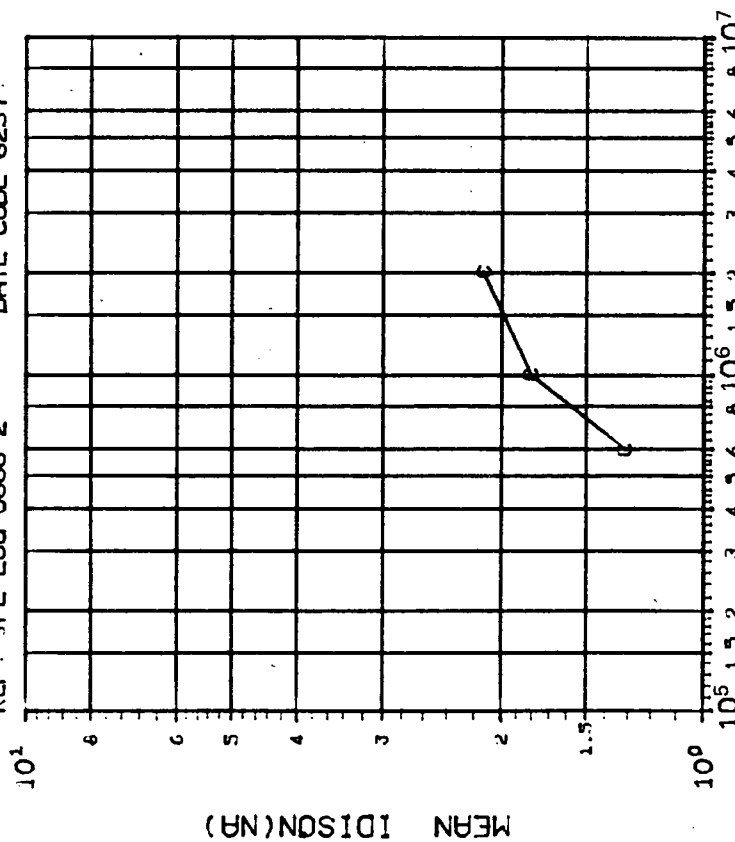
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| C | .5344 .1782 .6035 |

INITIAL MEAN VALUE IDISON(NA) = $1.15 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-2 DATE CODE 8237



DOSE, rad(Si) 2.5 MeV electrons

(3)ID (ON)+IS(ON) VD=VS=-7.5V IN NA VS DOSE

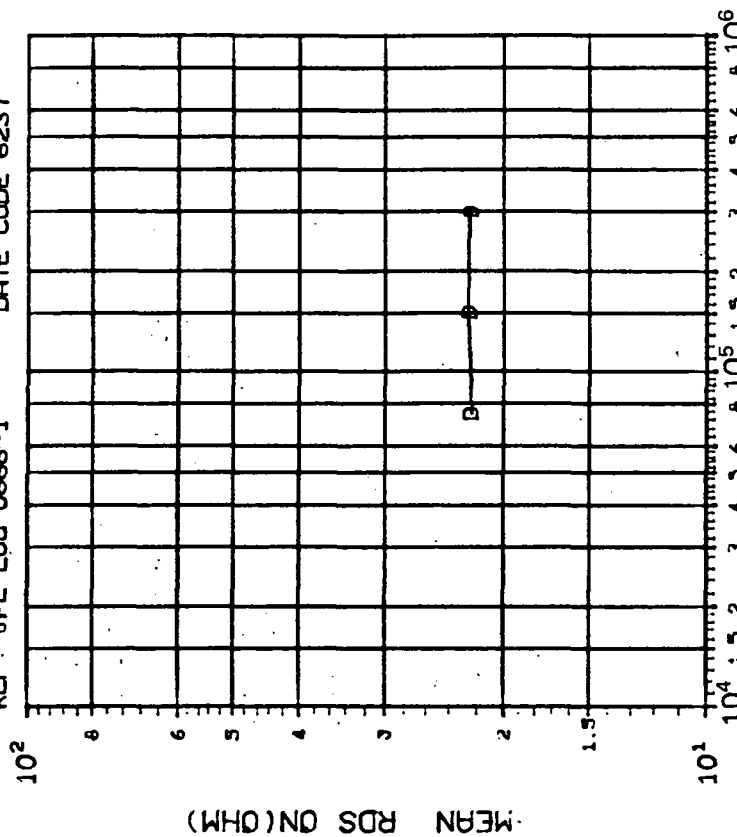
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| C | .6982 1.229 1.158 |

INITIAL MEAN VALUE IDISON(NA) = $1.15 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4)RDS (ON) VD=10V, IS=-10mA, VIN=2.5 VS DOSE

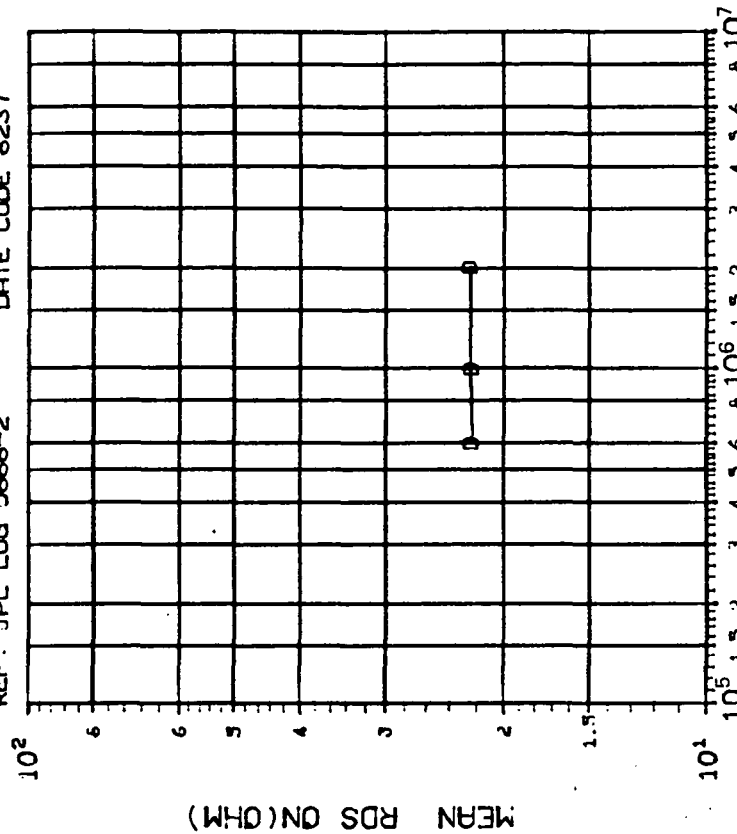
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | .75 150 300 |
| | .3033 .4031 .4320 |

INITIAL MEAN VALUE RDS ON(OHM) = 2.22X10¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0886-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

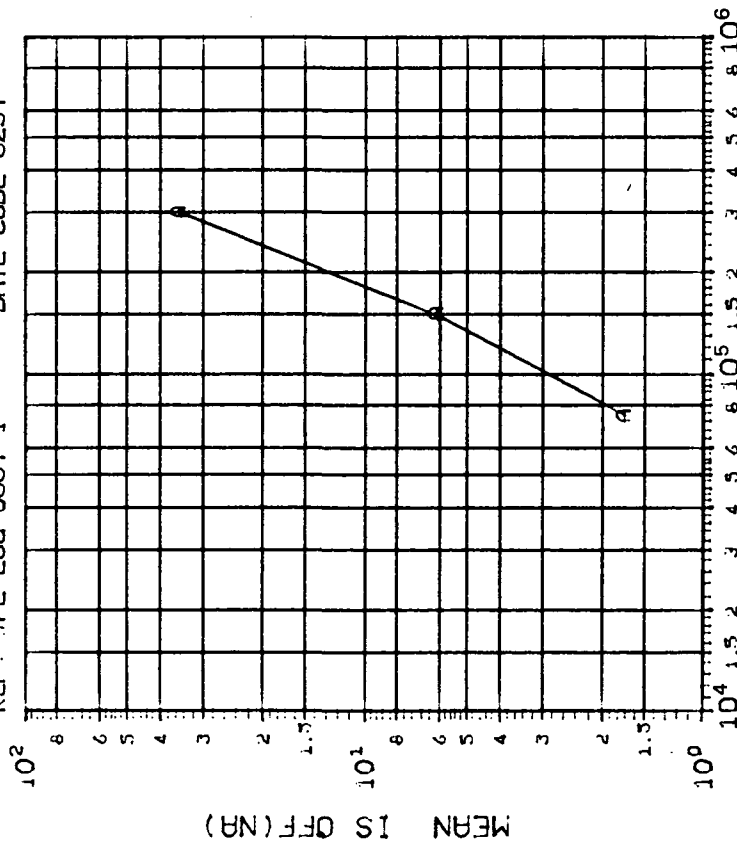
(4)RDS (ON) VD=10V, IS=-10mA, VIN=2.5 VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 600 1000 2000 |
| | .3500 .5500 .5033 |

INITIAL MEAN VALUE RDS ON(OHM) = 2.22X10¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83
REF: IPL LOG 0887-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

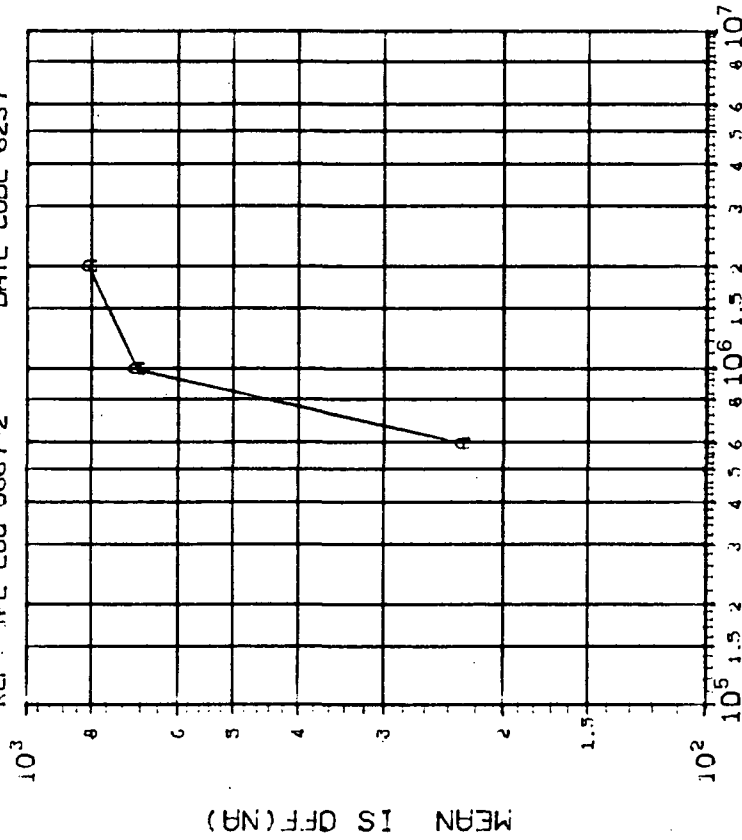
(1) IS (OFF) VS ± 7.5 , $V_D = -7.5$ V IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| A | 300 |
| | 7863 |
| A | 3.771 |
| | 40.57 |

INITIAL MEAN VALUE IS OFF (NA) = $4.78 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83
REF: IPL LOG 0887-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(1) IS (OFF) VS ± 7.5 , $V_D = -7.5$ V IN NA: VS DOSE

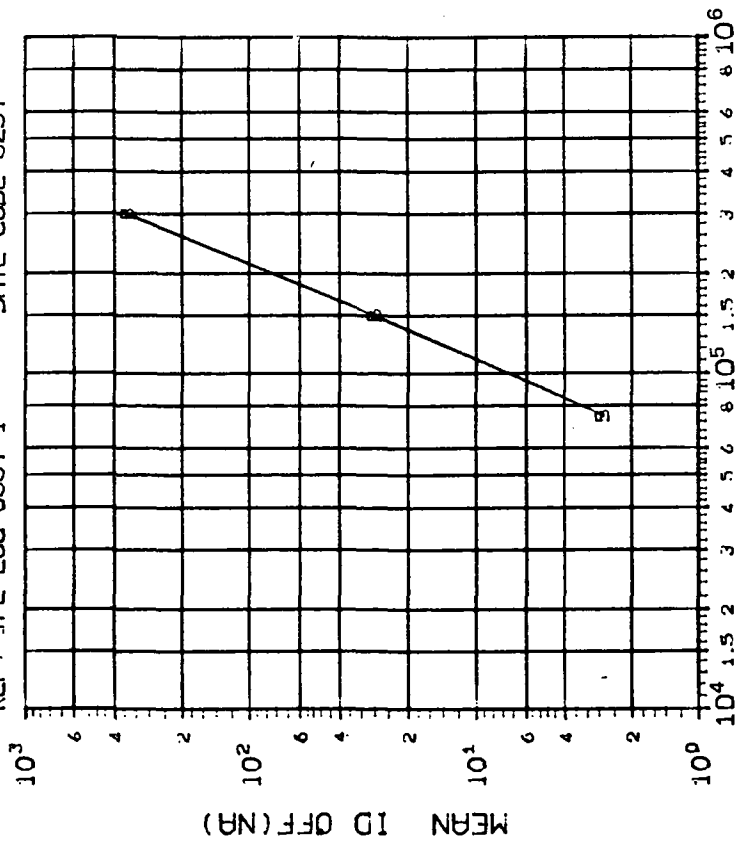
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 |
| | 1000 |
| A | 2000 |
| | 266.3 |
| A | 600.6 |
| | 944.3 |

INITIAL MEAN VALUE IS OFF (NA) = $4.78 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0887-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID (OFF) VD=+7.5, VS=-7.5V IN NA: VS DOSE

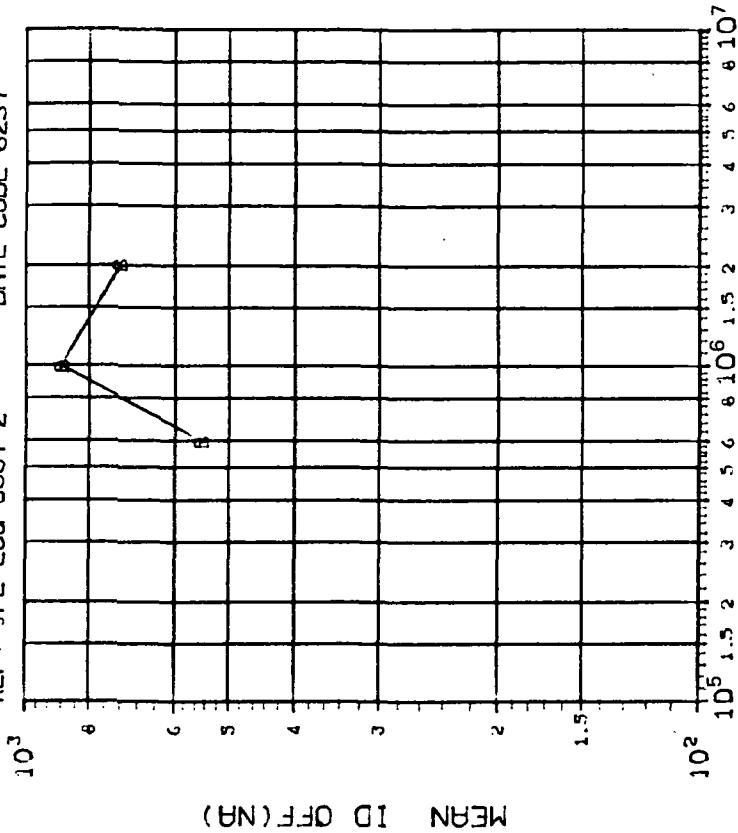
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-----|
| CURVE | DOSE, kilorads(Si) | |
| B | 75 | 150 |
| | 31.28 | 300 |
| | 405.1 | |

INITIAL MEAN VALUE ID OFF(NA) = $9.21 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0887-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID (OFF) VD=+7.5, VS=-7.5V IN NA: VS DOSE

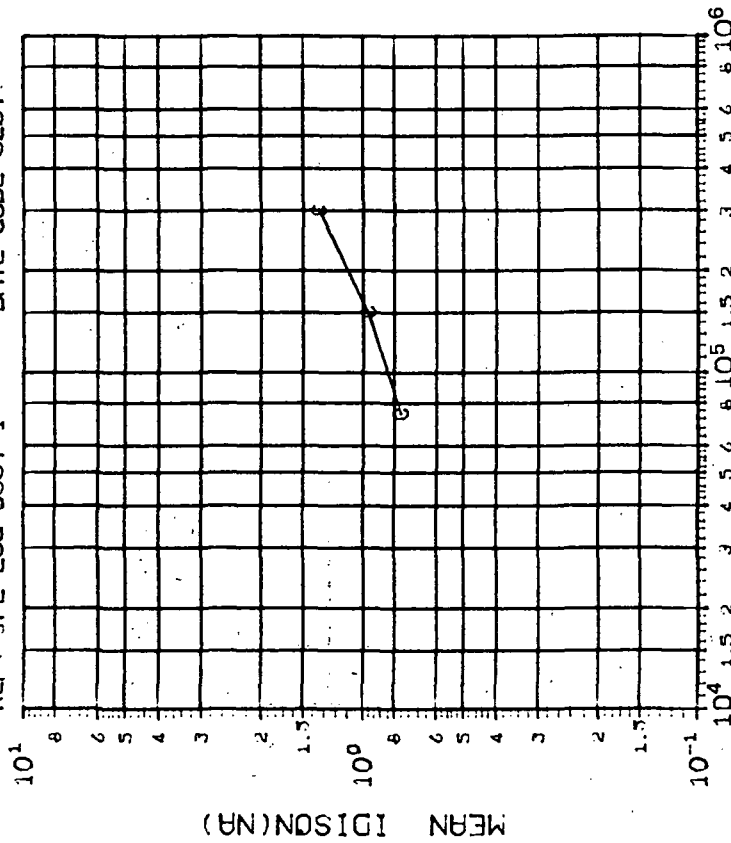
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| B | 600 | 1000 |
| | 631.6 | 2000 |
| | 1020 | 635.6 |

INITIAL MEAN VALUE ID OFF(NA) = $9.21 \times 10^{+0}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0887-1 DATE CODE 8237



DOSE, rad(Si) 2.5 MeV electrons

(3)ID (ON)+IS(ON) VD=VS=-7.5V IN NA VS DOSE

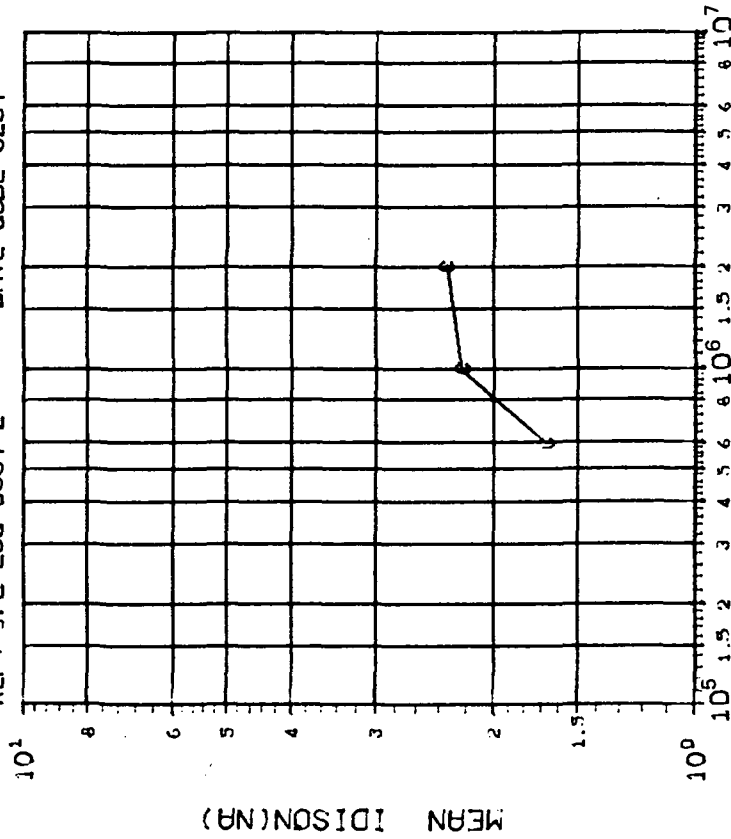
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| C | .3663 .4571 .5397 |

INITIAL MEAN VALUE IDISON(NA) = 9.69X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0887-2 DATE CODE 8237



DOSE, rad(Si) 2.5 MeV electrons

(3)ID (ON)+IS(ON) VD=VS=-7.5V IN NA VS DOSE

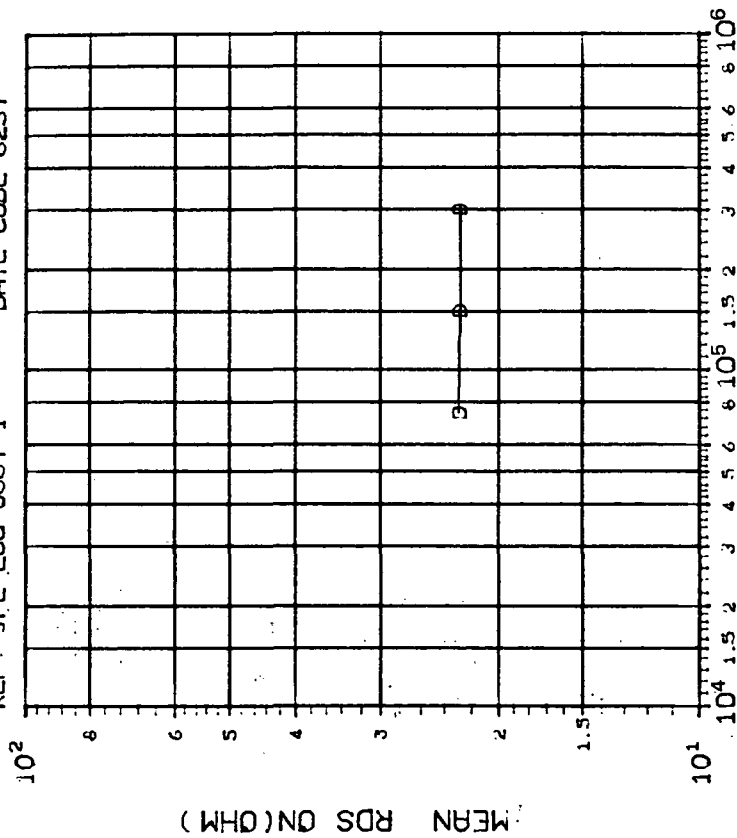
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| C | .5026 .9259 1.053 |

INITIAL MEAN VALUE IDISON(NA) = 9.69X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0887-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4) RDS (ON) VD=10V, IS=-10mA, VIN=2.5 VS DOSE

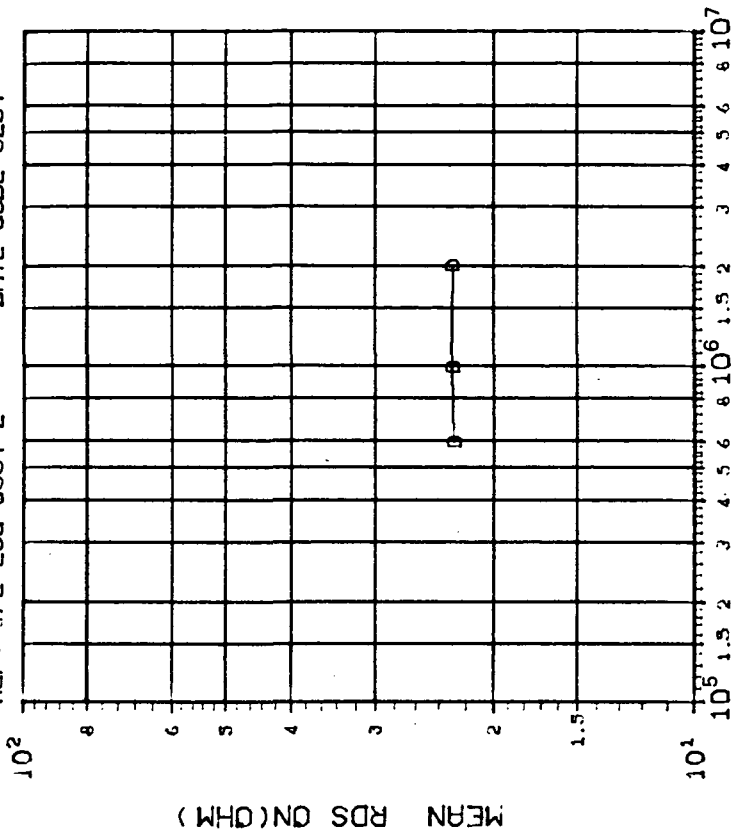
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 150 300 |
| D | 1.063 1.066 1.066 |

INITIAL MEAN VALUE RDS ON (ohm) = $2.28 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0887-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4) RDS (ON) VD=10V, IS=-10mA, VIN=2.5 VS DOSE

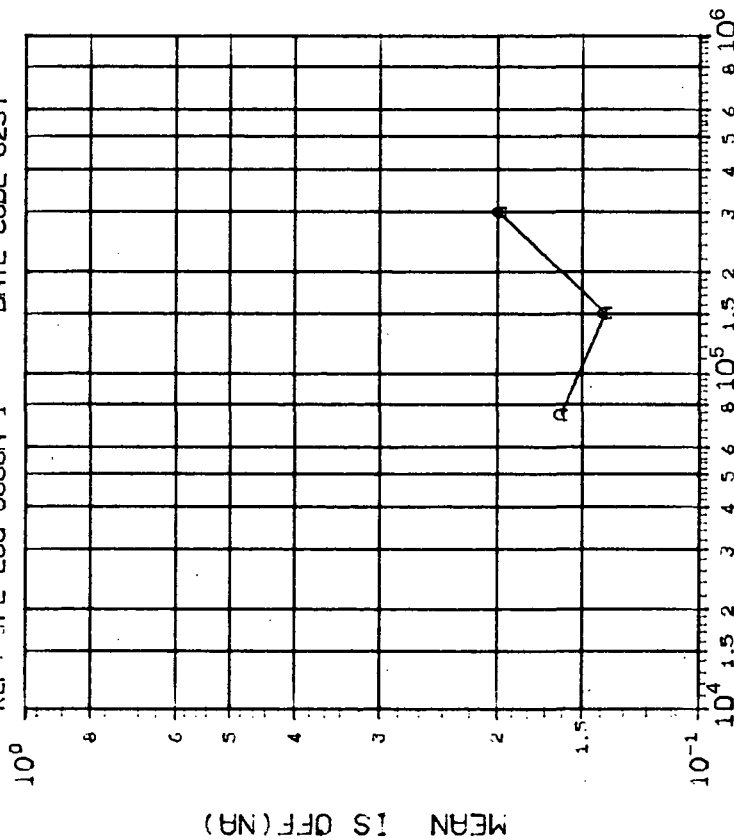
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 600 1000 2000 |
| D | 1.063 1.112 1.162 |

INITIAL MEAN VALUE RDS ON (ohm) = $2.28 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

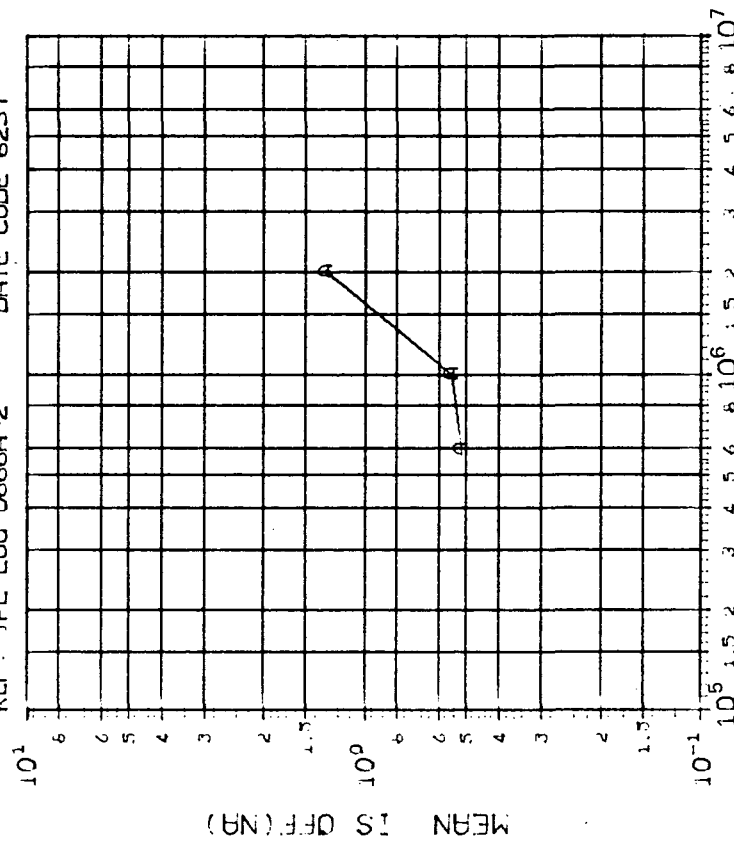
REF: JPL LOG 0888A-1 DATE CODE 8237



DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

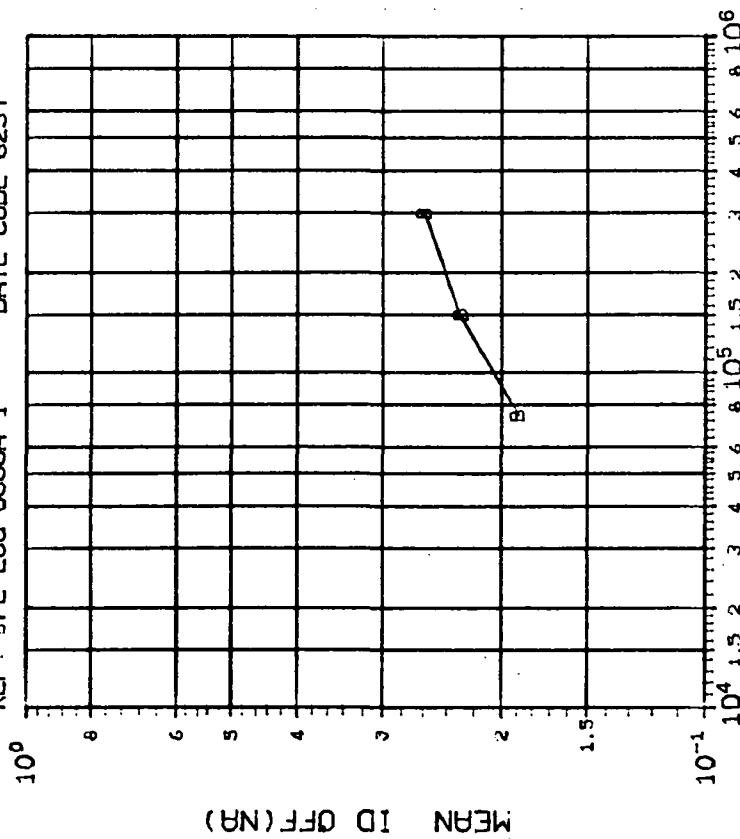
REF: JPL LOG 0888A-2 DATE CODE 8237



DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0888A-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID OFF (NA) VS DOSE

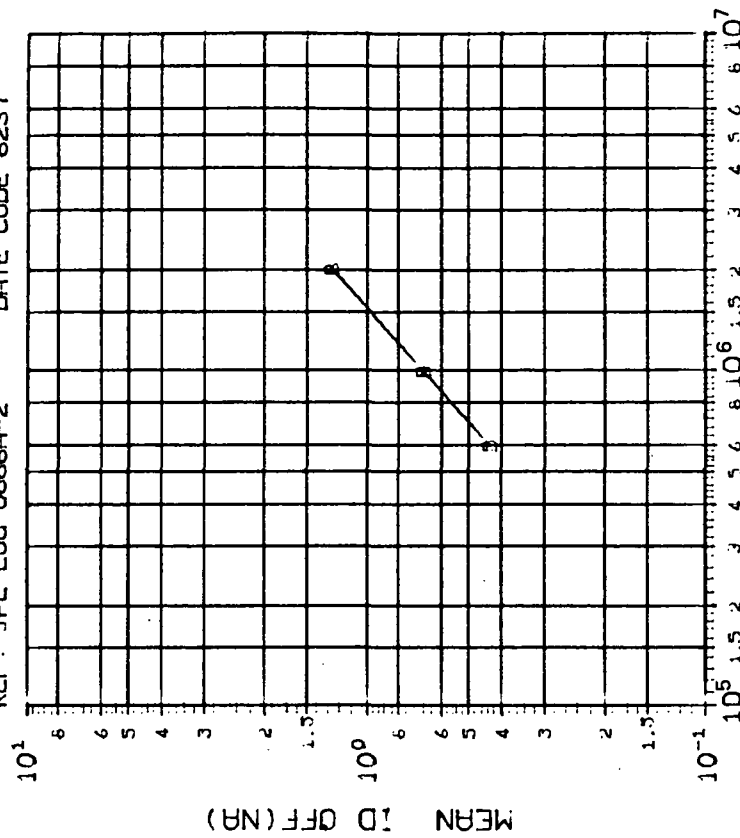
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | .1012 .1163 .1176 |

INITIAL MEAN VALUE ID OFF (NA) = 2.40×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0888A-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID OFF (NA) VS DOSE

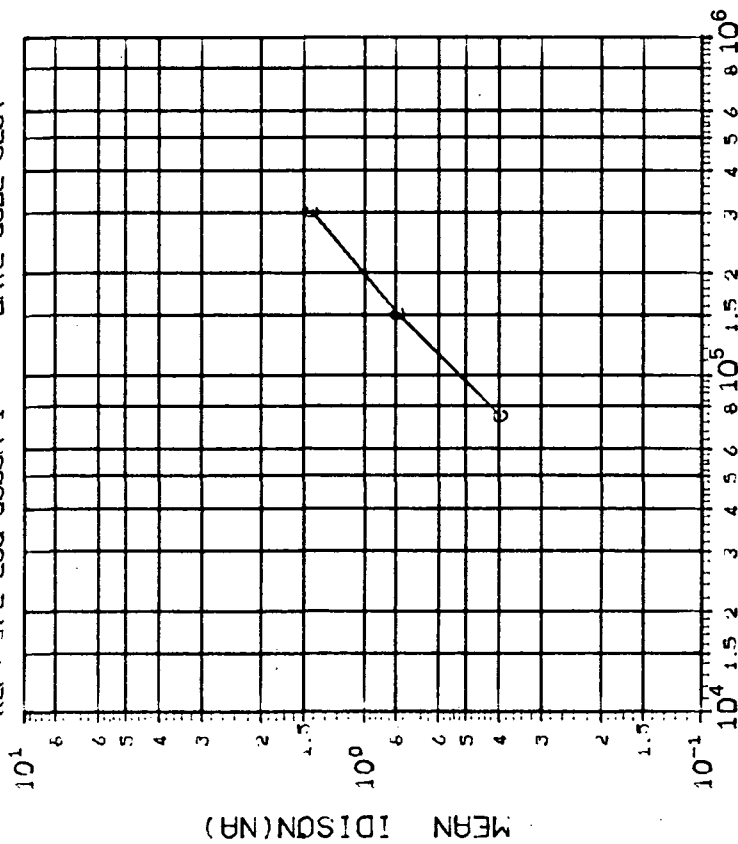
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 |
| | 1000 |
| | 2000 |
| | .1628 .2447 .3397 |

INITIAL MEAN VALUE ID OFF (NA) = 2.40×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0888A-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(3)IDISON(NA) VS DOSE

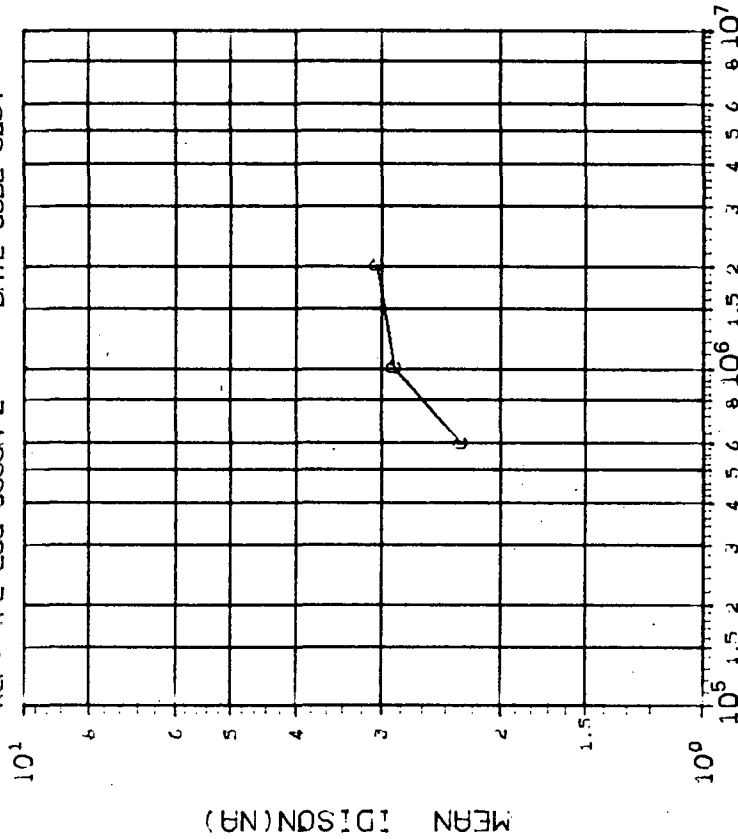
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 150 300 |
| | .1668 .1491 .1190 |

INITIAL MEAN VALUE IDISON(NA) = 1.62×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0888A-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(3)IDISON(NA) VS DOSE

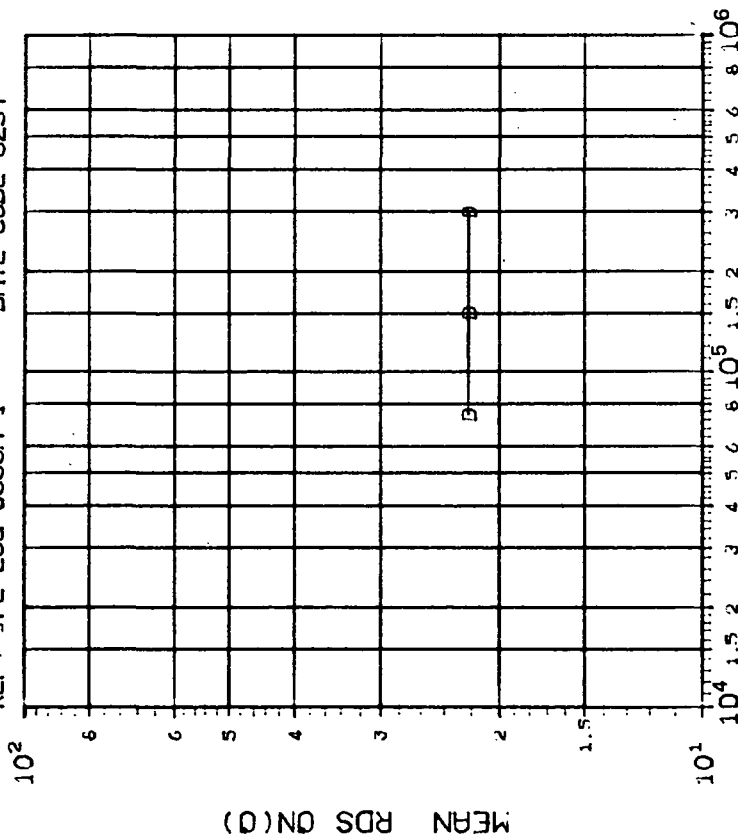
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 1000 2000 |
| | .2121 .3227 .2360 |

INITIAL MEAN VALUE IDISON(NA) = 1.62×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0888A-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4)RDS ON(0) VS DOSE

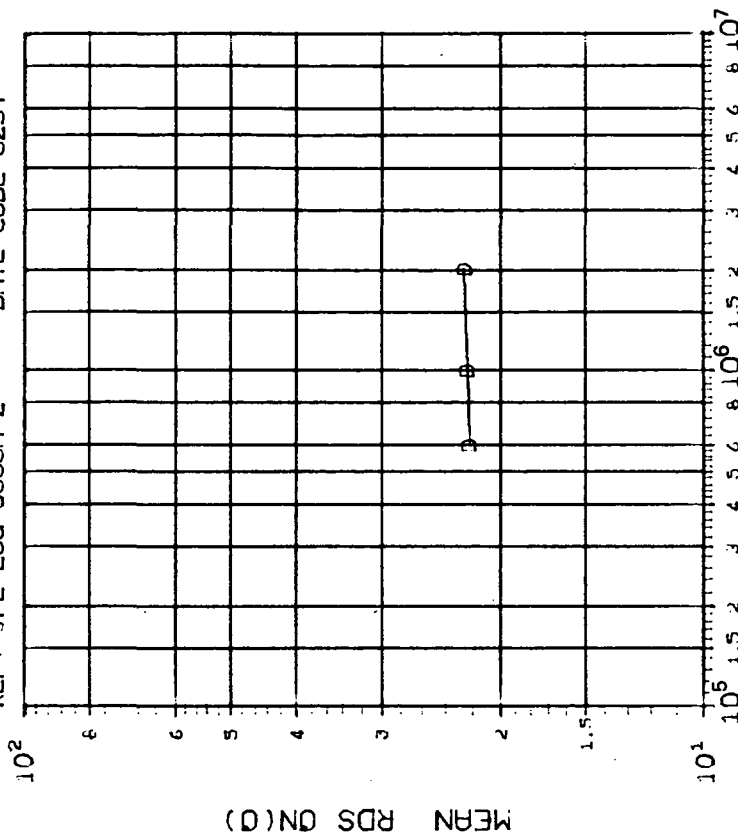
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 150 300 |
| | 1.972 1.948 1.997 |

INITIAL MEAN VALUE RDS ON(0) = $2.24 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0888A-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4)RDS ON(0) VS DOSE

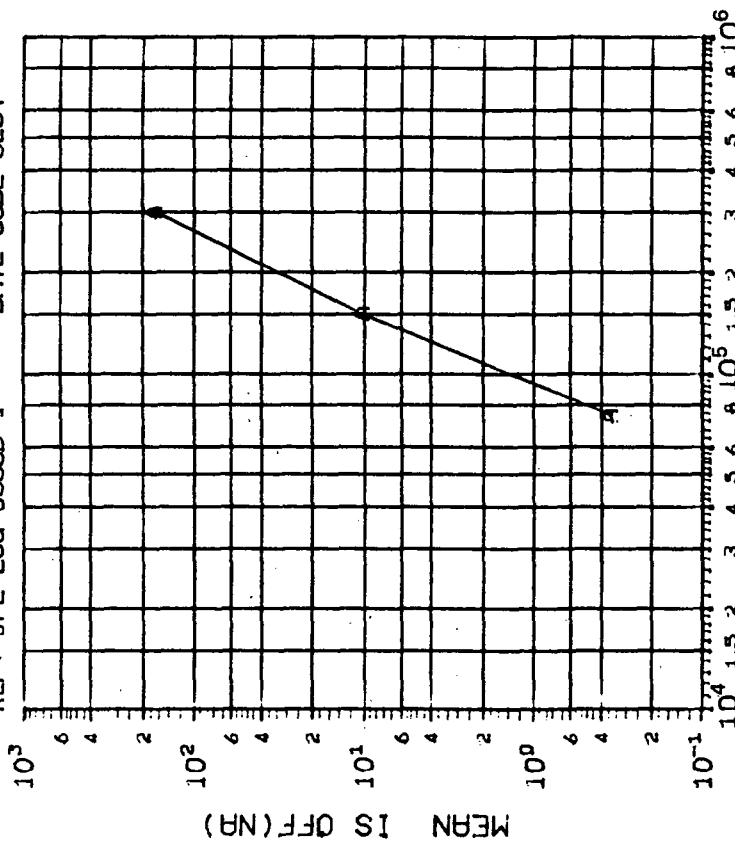
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 600 1000 2000 |
| | 2.002 2.027 2.102 |

INITIAL MEAN VALUE RDS ON(0) = $2.24 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 08888-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(1) IS OFF (NA) VS DOSE

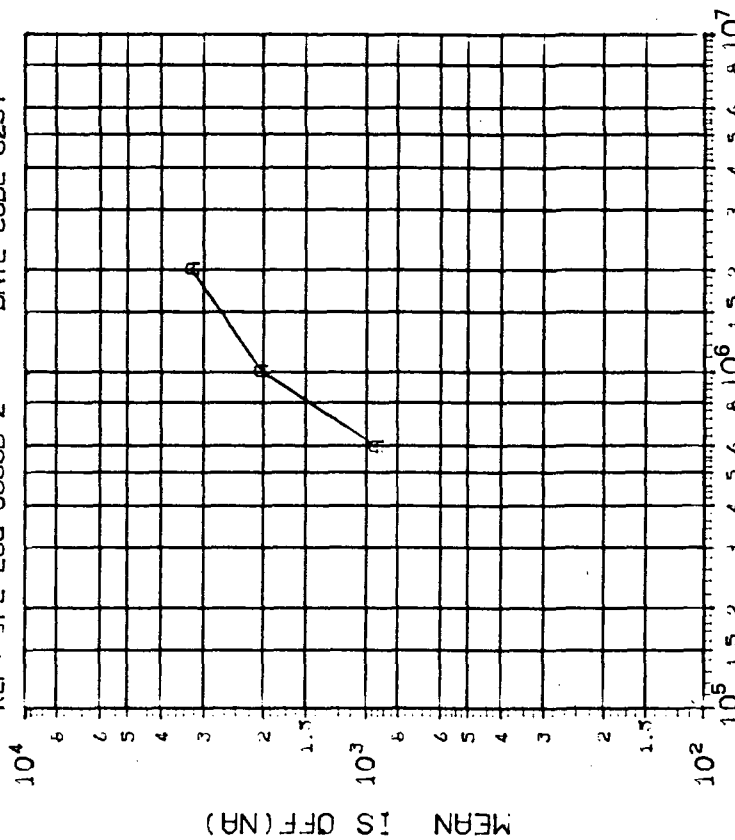
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| A | |
| | .1284 13.98 108.4 |

INITIAL MEAN VALUE IS OFF (NA) = 2.26×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 08888-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(1) IS OFF (NA) VS DOSE

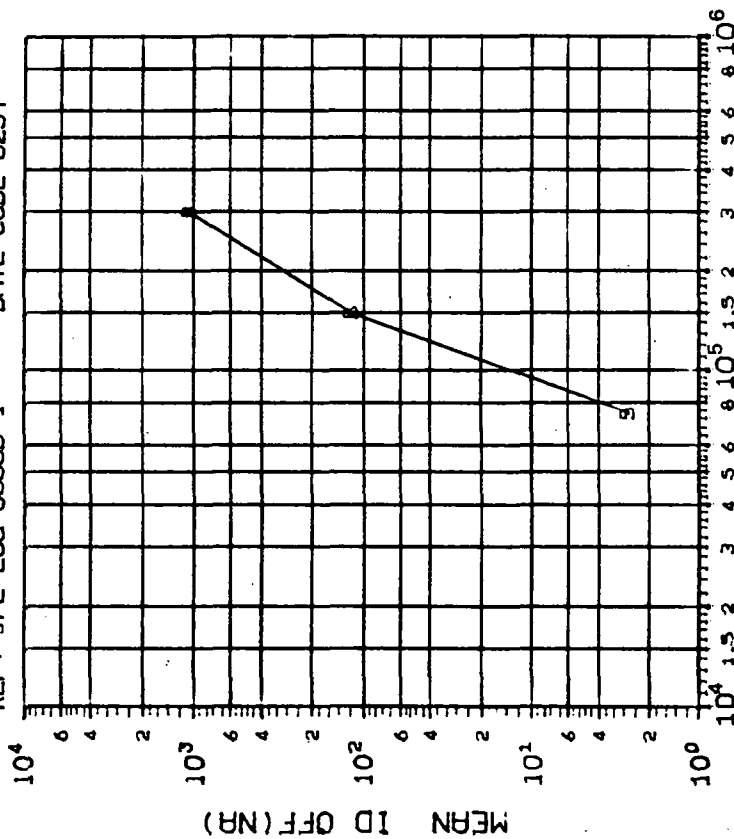
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 |
| | 1000 |
| | 2000 |
| A | |
| | 183.6 276.9 518.6 |

INITIAL MEAN VALUE IS OFF (NA) = 2.26×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0868B-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(2) ID OFF (NA) VS DOSE

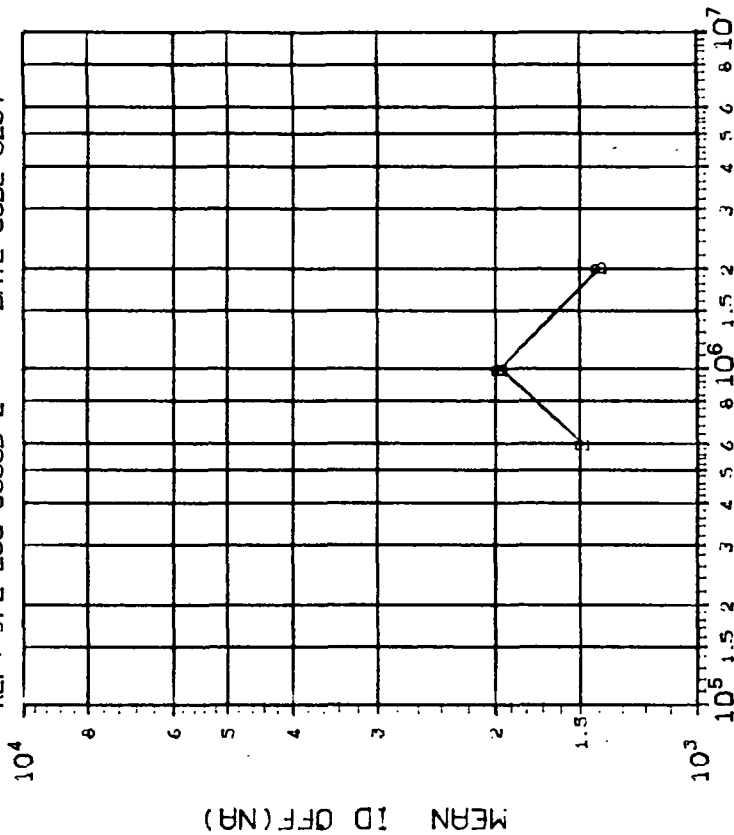
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 150 300 |
| | 1.694 59.74 222.3 |

INITIAL MEAN VALUE ID OFF (NA) = 2.36×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 0868B-2 DATE CODE 8237



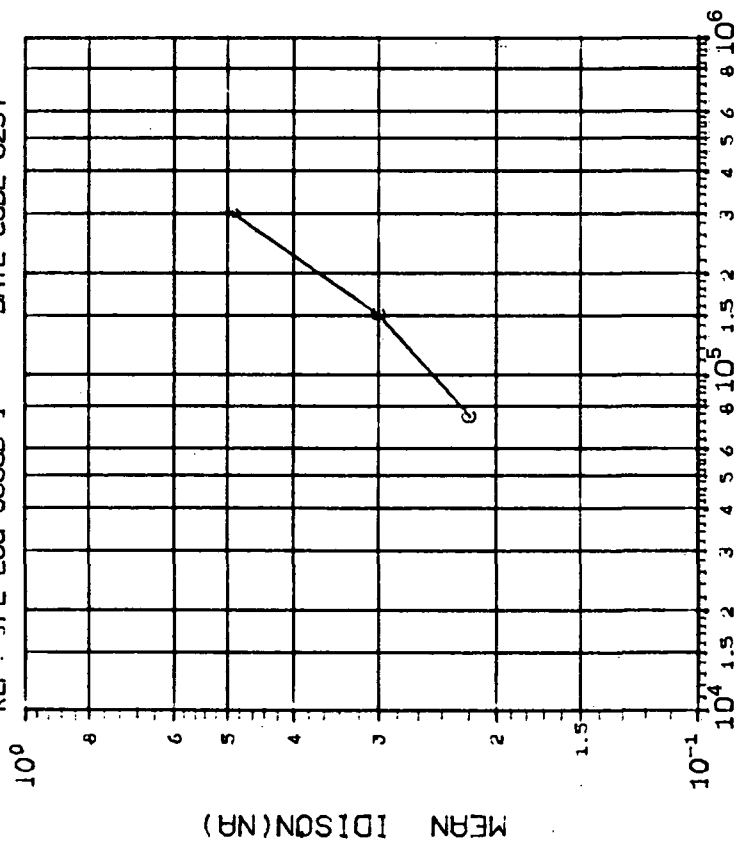
DOSE, rads(Si) 2.5 MeV electrons

(2) ID OFF (NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 1000 2000 |
| | 215.5 348.5 252.1 |

INITIAL MEAN VALUE ID OFF (NA) = 2.36×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)
MFG: SIL 4 DEVICES TEST DATE 7-13-83
REF: JPL LOG 0888B-1 DATE CODE 8237

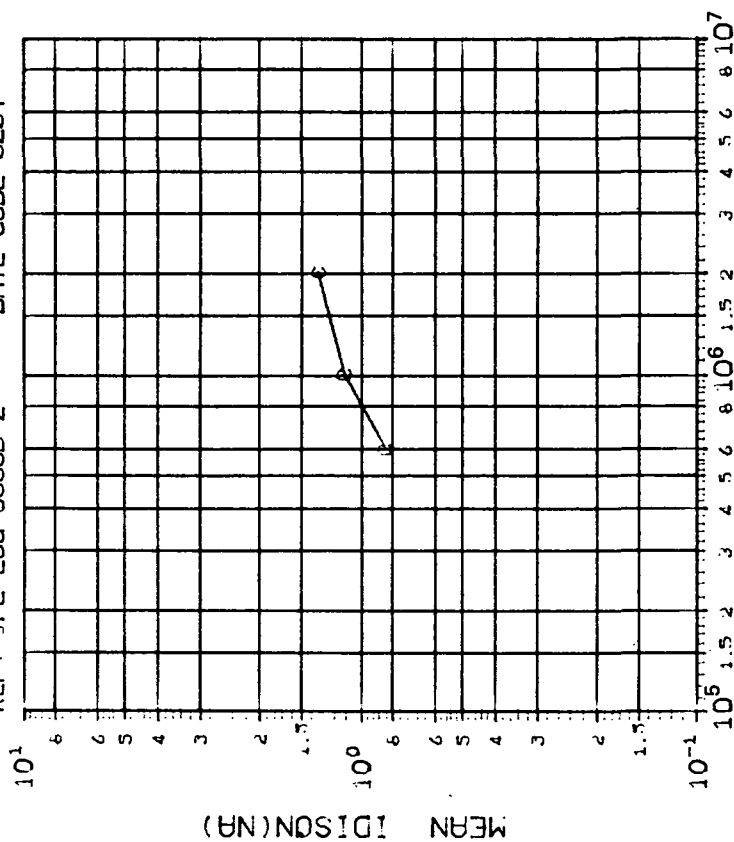


DOSE, rads(Si) 2.5 MeV electrons
(31)IDISON(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| .0612 .0596 .0780 | |

INITIAL MEAN VALUE IDISON(NA) = 1.62×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)
MFG: SIL 4 DEVICES TEST DATE 7-13-83
REF: JPL LOG 0888B-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons
(3)IDISON(NA) VS DOSE

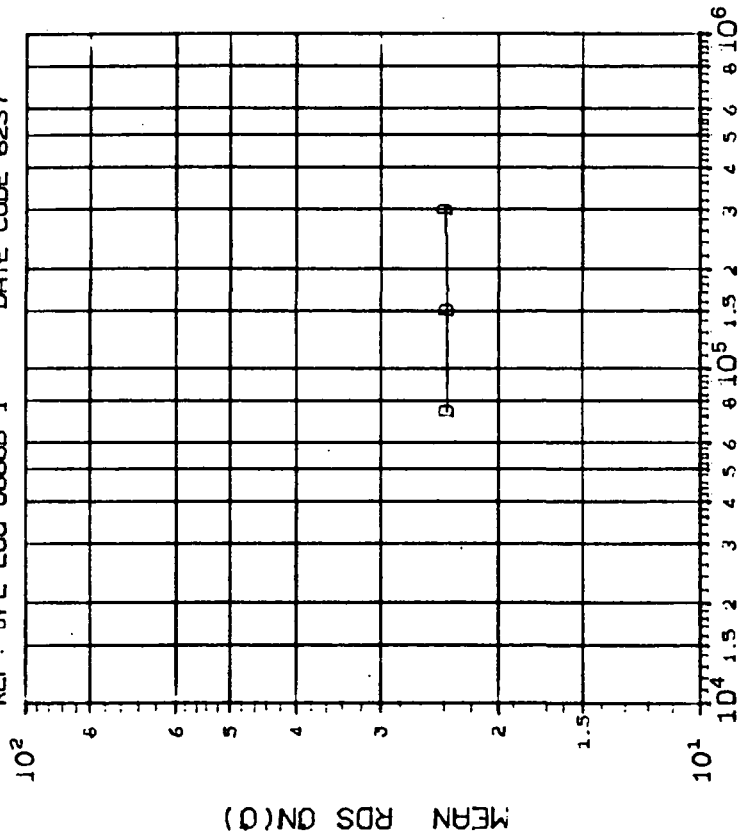
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| .1443 .1262 .1667 | |

INITIAL MEAN VALUE IDISON(NA) = 1.62×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 08888-1 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4)RDS ON(0) VS DOSE

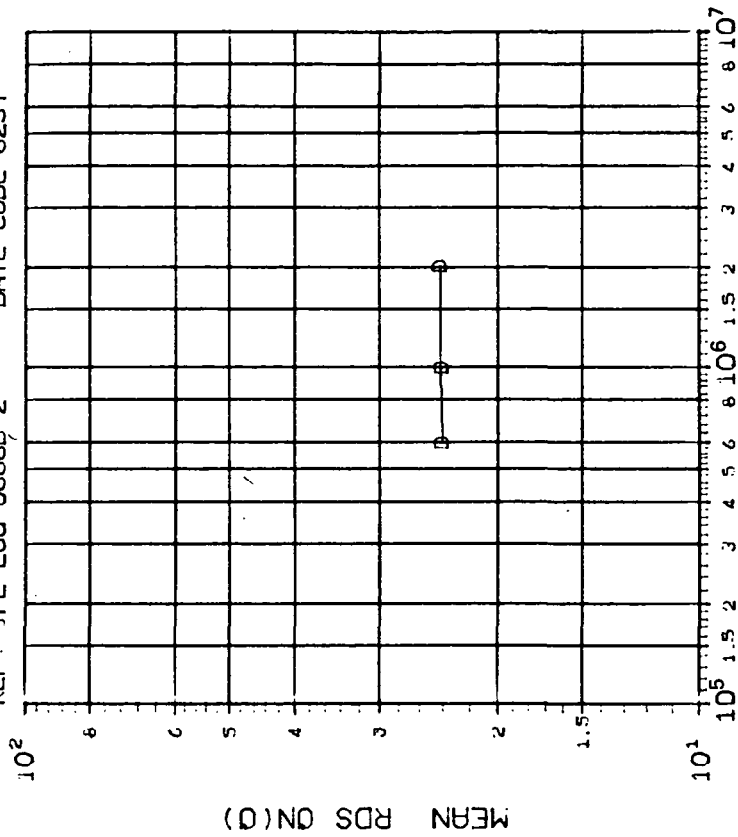
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| .6652 .6183 .6131 | |

INITIAL MEAN VALUE RDS ON(0) = $2.37 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 7-13-83

REF: JPL LOG 08888-2 DATE CODE 8237



DOSE, rads(Si) 2.5 MeV electrons

(4)RDS ON(0) VS DOSE

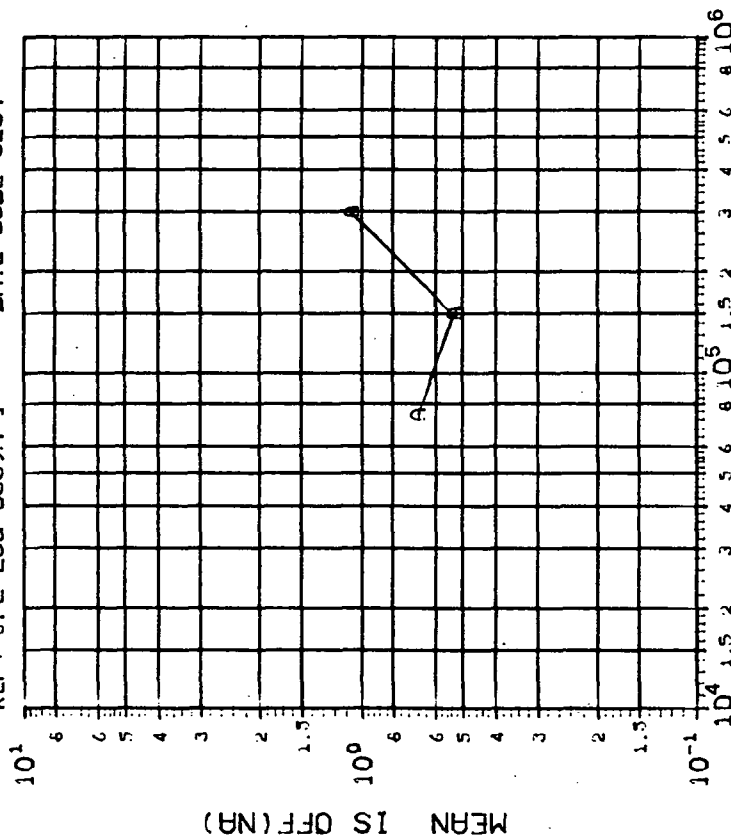
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 600 |
| | 1000 |
| | 2000 |
| .6850 .6850 .7118 | |

INITIAL MEAN VALUE RDS ON(0) = $2.37 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0889A-1 DATE CODE 8237



(1) ISOFF (VS=7.5, VD=-7.5V, VINE=0.8V) NA VS DOSE

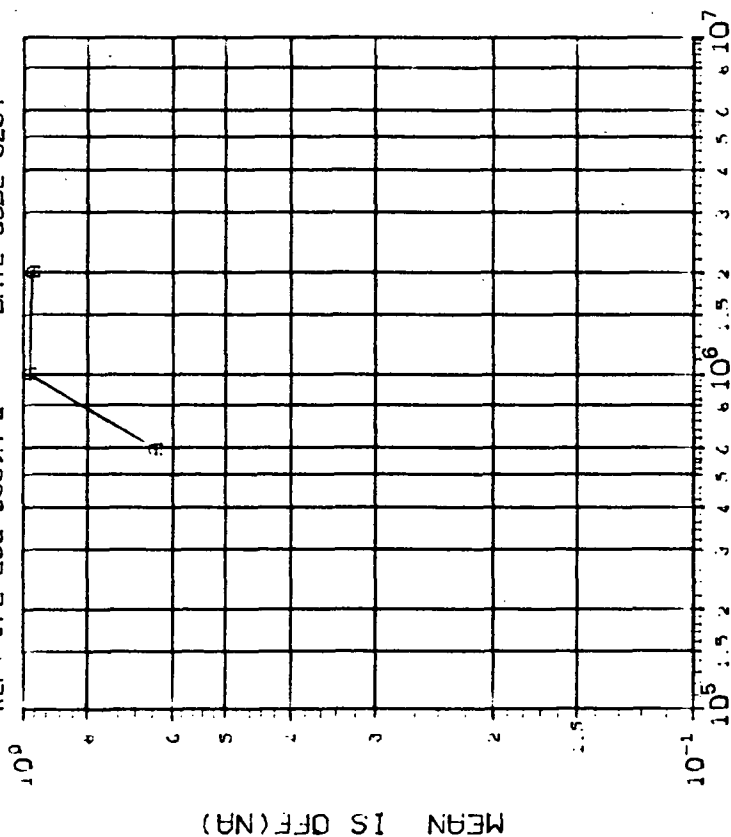
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 |
| A | .5492 | .4162 1.368 |

INITIAL MEAN VALUE IS OFF (NA) = 8.45×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0889A-2 DATE CODE 8237



(1) ISOFF (VS=7.5, VD=-7.5V, VINE=0.8V) NA VS DOSE

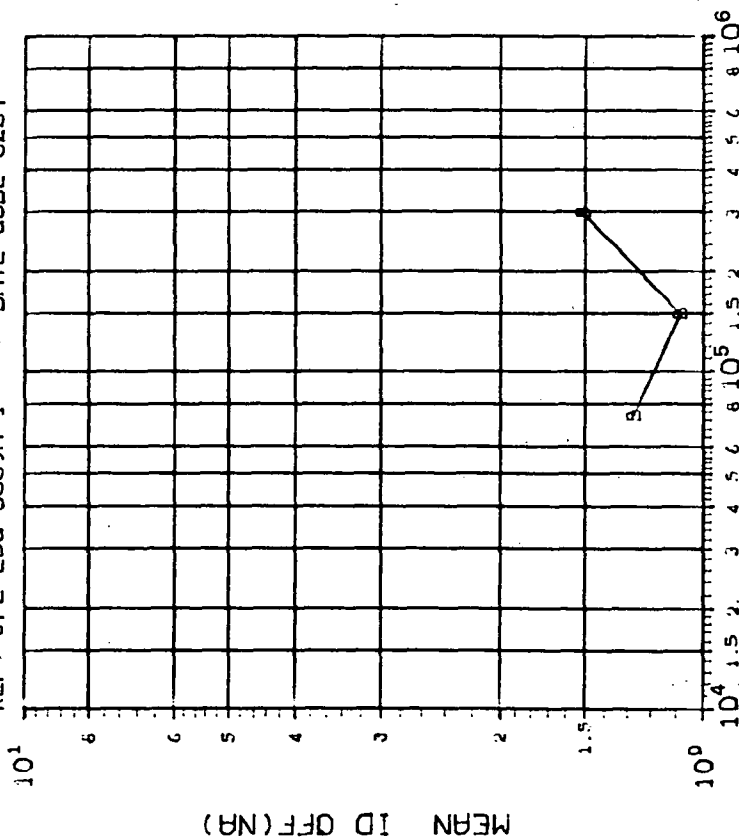
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 600 | 1000 2000 |
| A | .2981 | .4297 .3287 |

INITIAL MEAN VALUE IS OFF (NA) = 8.45×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0889A-1 DATE CODE 8237



DOSE, rads(Si) Co⁶⁰ Gammas

(2) ID OFF (V_D=7.5V, V_S=-7.5V, V_{IN}=0.6VIN VS DOSE

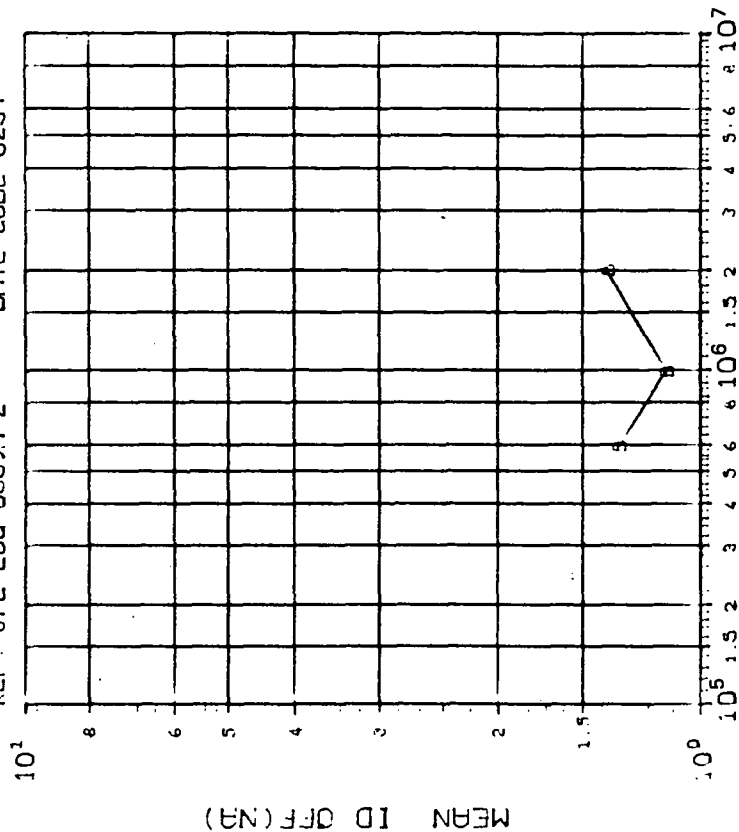
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 |
| B | 1.596 | 1.308 |
| | 1.308 | 1.524 |

INITIAL MEAN VALUE ID OFF (NA) = 3.01X10⁻⁹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0889A-2 DATE CODE 8237



DOSE, rads(Si) Co⁶⁰ Gammas

(2) ID OFF (V_D=7.5V, V_S=-7.5V, V_{IN}=0.6VIN VS DOSE

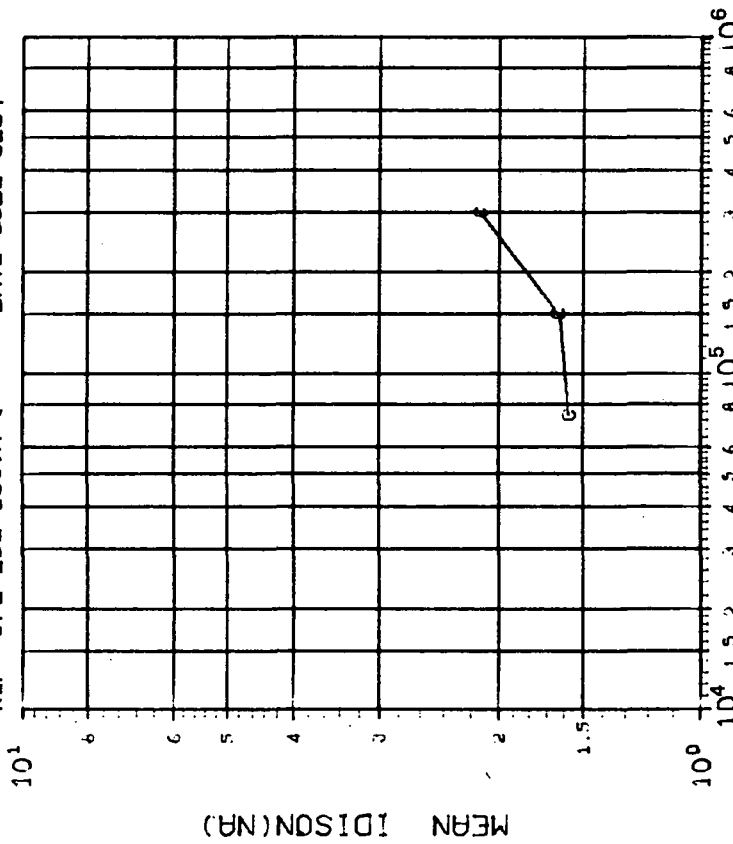
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 600 | 1000 |
| S | 1.516 | 1.206 |
| | 1.206 | 1.426 |

INITIAL MEAN VALUE ID OFF (NA) = 3.01X10⁻⁹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0889A-1 DATE CODE 8237



DOSE, rad(Si) Co 60 Gammas

(3) IDON+ISON(VD=VS=-7.5V, VIN=2.5V) NA VS DOSE

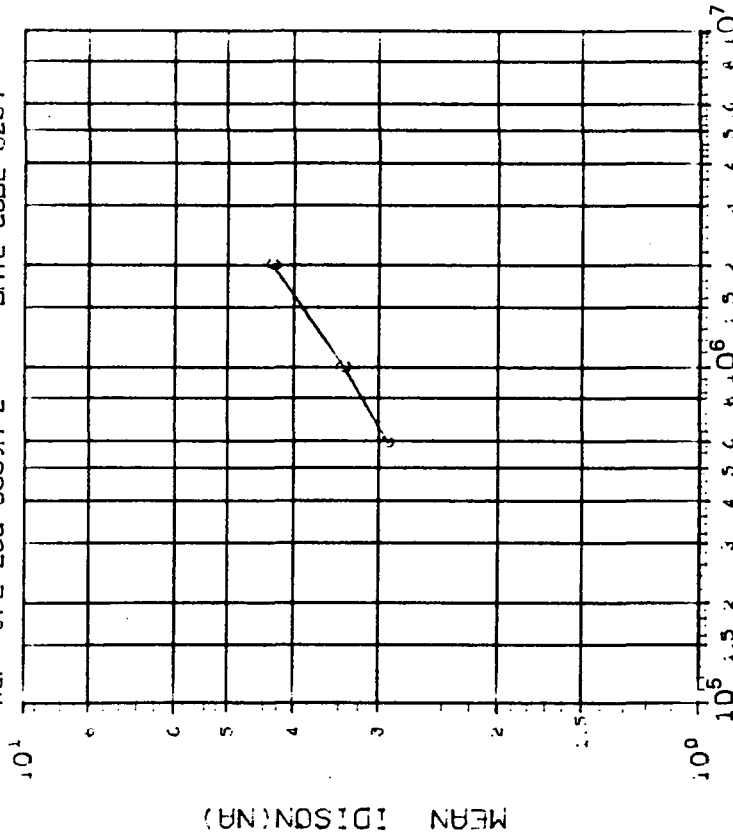
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 75 | 1.592 |
| | 300 | 1.612 |

INITIAL MEAN VALUE IDISON(NA) = 1.64×10^{-9}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0889A-2 DATE CODE 8237



DOSE, rad(Si) Co 60 Gammas

(3) IDON+ISON(VD=VS=-7.5V, VIN=2.5V) NA VS DOSE

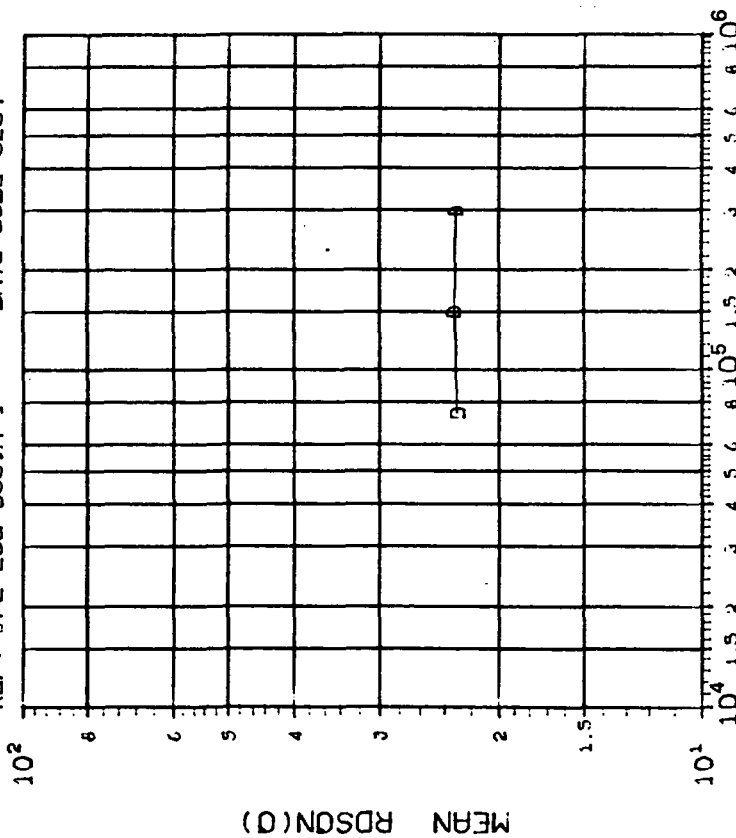
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 600 | 1.153 |
| | 2000 | 2.040 |

INITIAL MEAN VALUE IDISON(NA) = 1.64×10^{-9}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0869A-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(4) RDSON(V=10V, IS=-10MA, VIN=2.5V) OHM VS DOSE

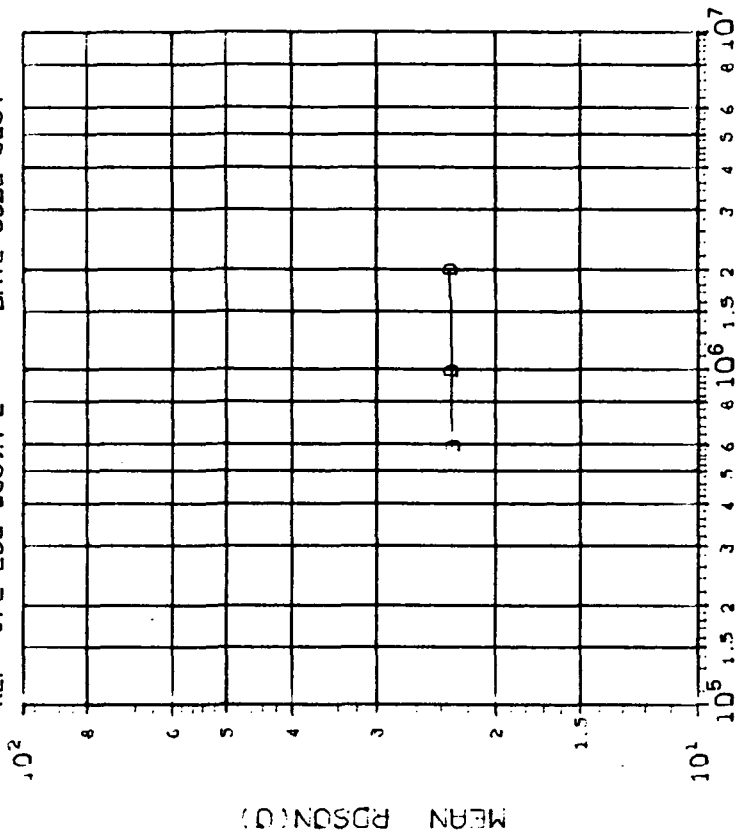
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 150 300 |
| | 1.226 1.226 1.206 |

INITIAL MEAN VALUE RDSON(Ω) = 2.34X10¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 0869A-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(4) RDSON(V=10V, IS=-10MA, VIN=2.5V) OHM VS DOSE

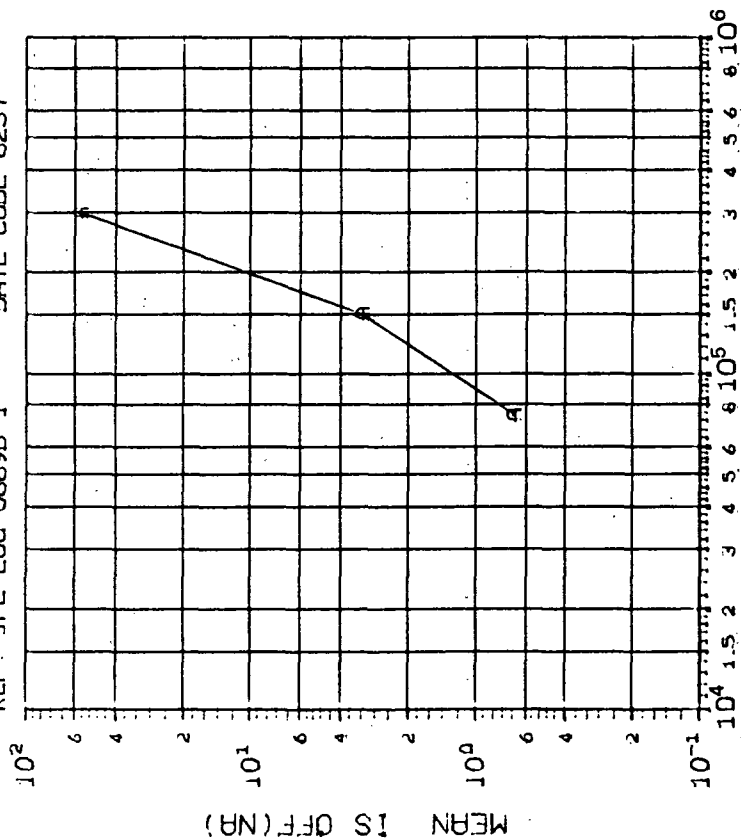
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 600 1000 2000 |
| | 1.228 1.278 1.276 |

INITIAL MEAN VALUE RDSON(Ω) = 2.34X10¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 08898-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(1) ISOFF (VS=-7.5, VD=-7.5V, VIN=0.8V) NA VS DOSE

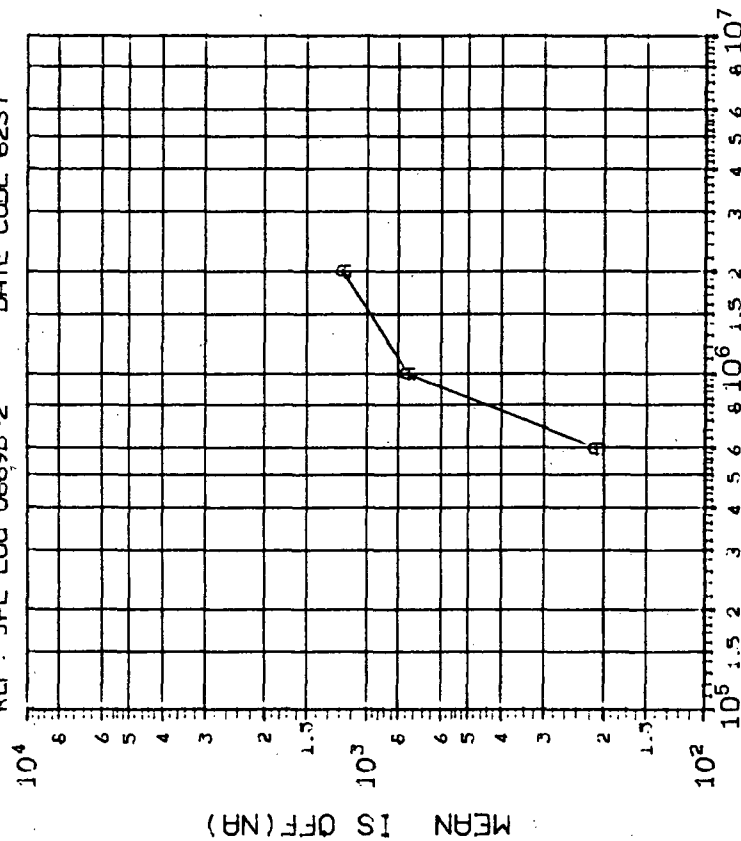
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| | 2773 1440 55.37 |

INITIAL MEAN VALUE IS OFF (NA) = 7.04×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 08898-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(1) ISOFF (VS=-7.5, VD=-7.5V, VIN=0.8V) NA VS DOSE

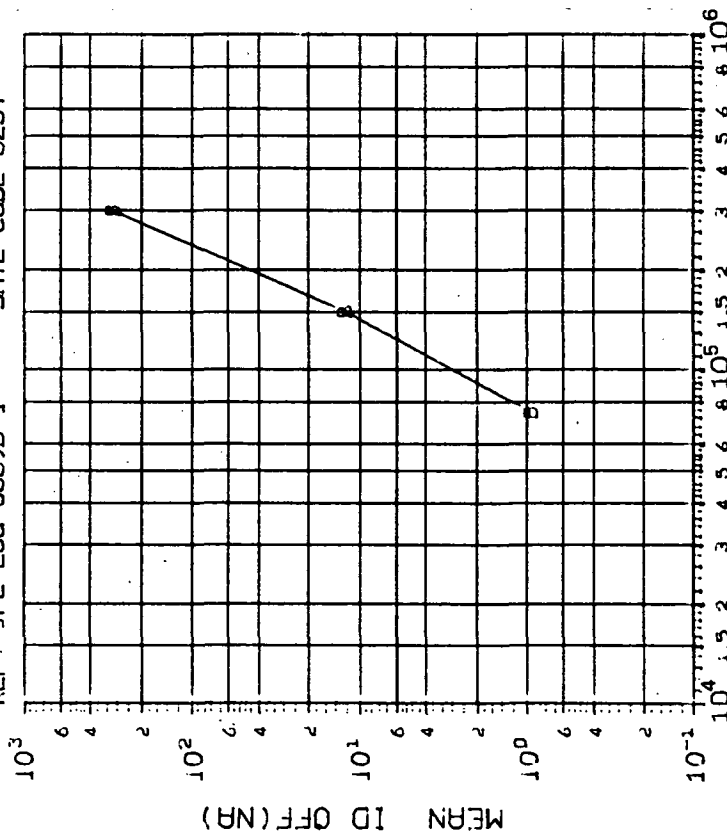
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| | 120.9 199.7 71.36 |

INITIAL MEAN VALUE IS OFF (NA) = 7.04×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 08898-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(2) ID OFF (VD=-7.5V, VS=-7.5V, VIN=0.8V) N VS DOSE

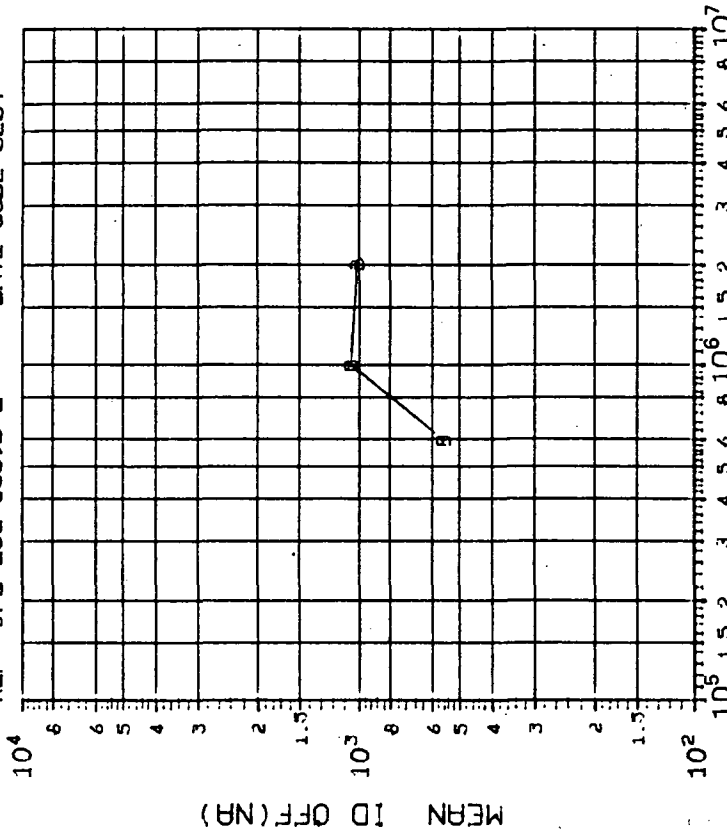
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| .2711 6.151 99.34 | |

INITIAL MEAN VALUE ID OFF (NA) = 9.30×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 08898-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(2) ID OFF (VD=-7.5V, VS=-7.5V, VIN=0.8V) N VS DOSE

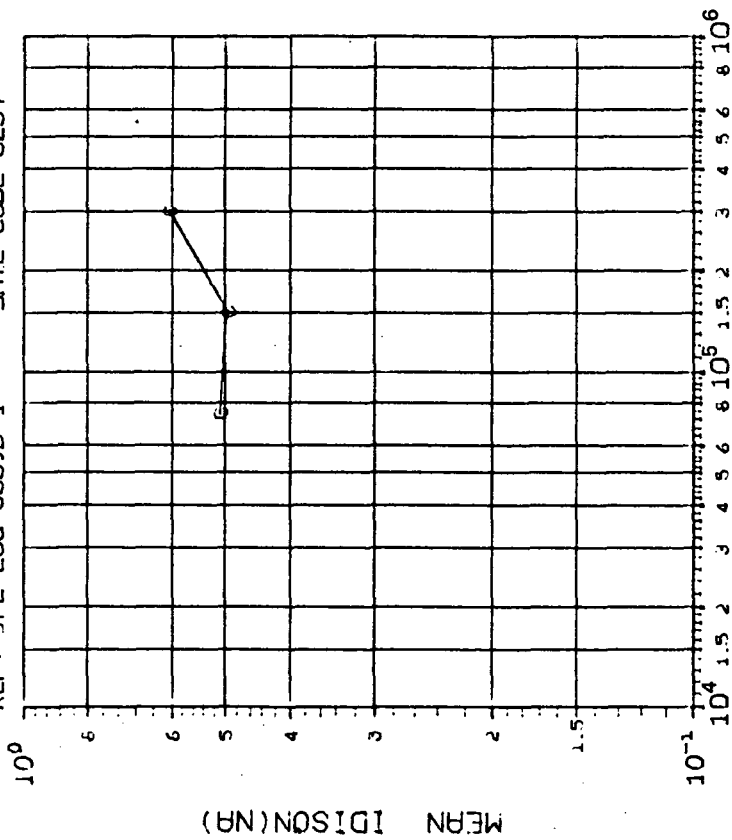
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 |
| | 1000 |
| | 2000 |
| 80.66 214.5 278.4 | |

INITIAL MEAN VALUE ID OFF (NA) = 9.30×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 08898-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(3) IDON+ISON(VD=VS=-7.5V, VIN=2.5V) NA VS DOSE

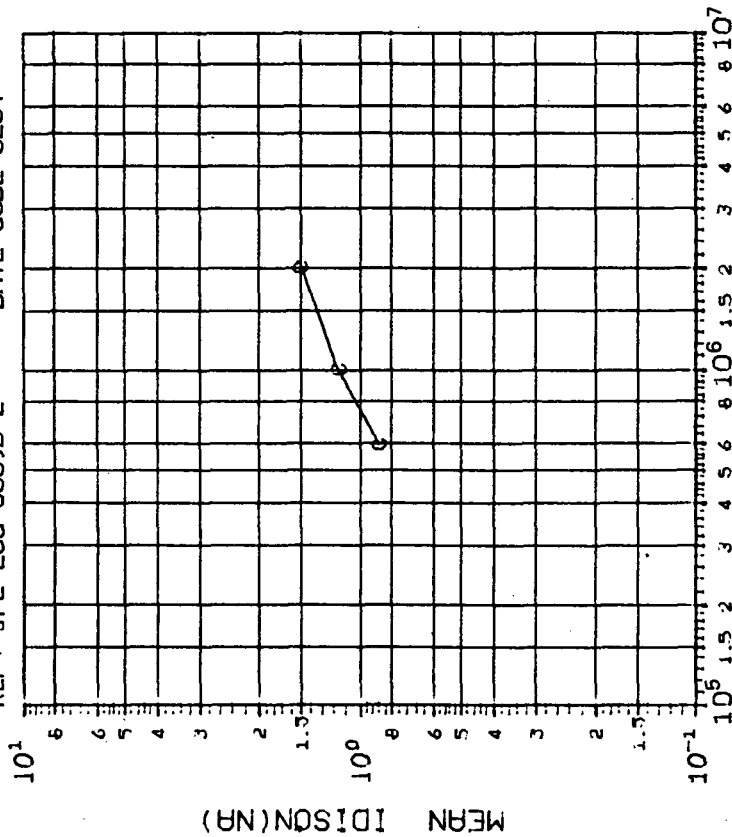
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| .2800 .1693 .2076 | |

INITIAL MEAN VALUE IDISON(NA) = 6.35×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 08898-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(3) IDON+ISON(VD=VS=-7.5V, VIN=2.5V) NA VS DOSE

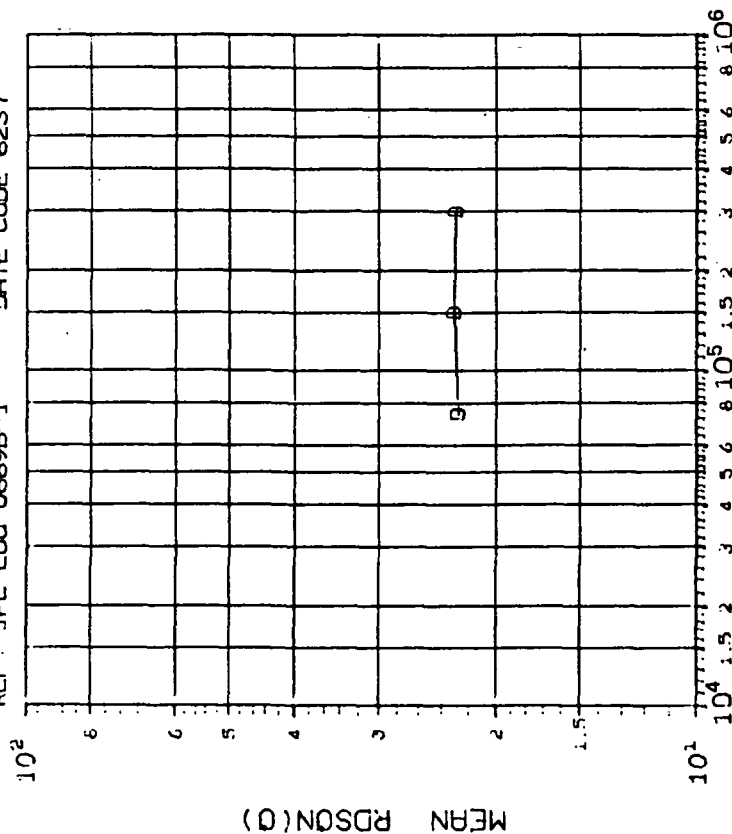
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| .2020 .1013 .0956 | |

INITIAL MEAN VALUE IDISON(NA) = 6.35×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 06898-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(4) RDSON(V=10V, IS=-10MA, VIN=2.5V) OHM VS DOSE

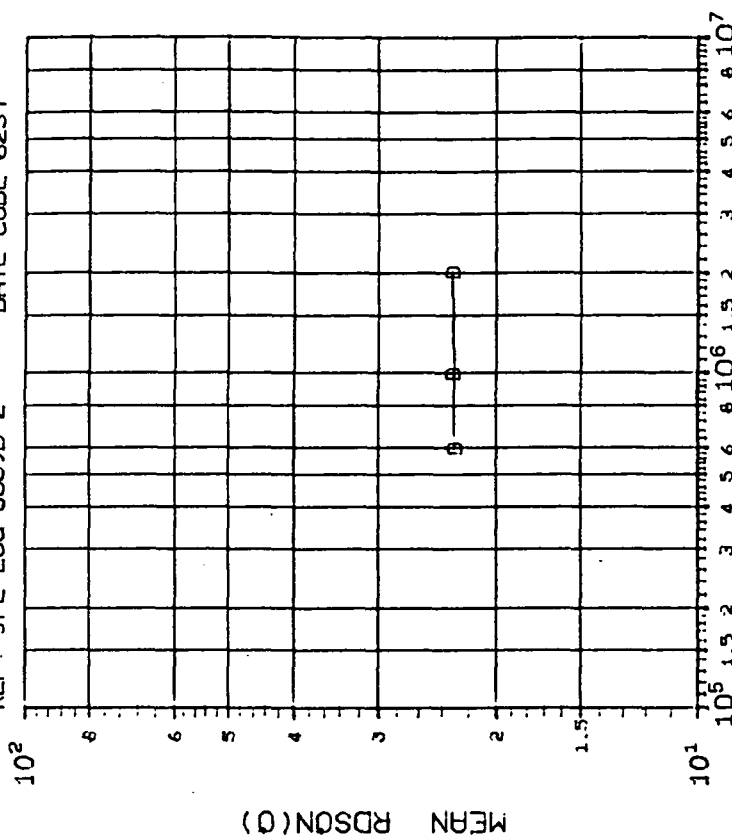
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 150 300 |
| D | .6076 .6557 .6292 |

INITIAL MEAN VALUE RDSON(O) = 2.26×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 6-23-83

REF: JPL LOG 08598-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(4) RDSON(V=10V, IS=-10MA, VIN=2.5V) OHM VS DOSE

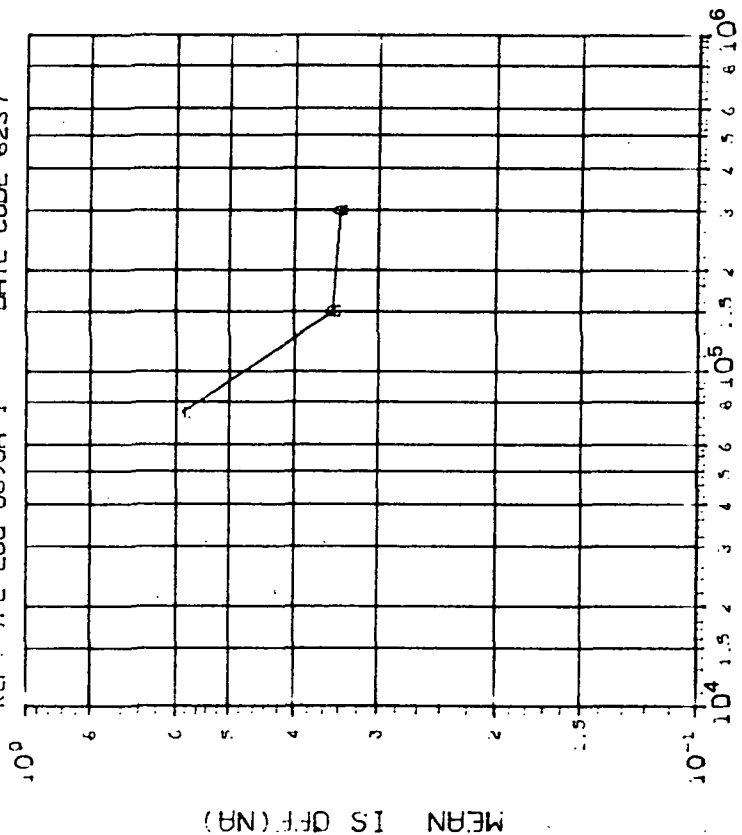
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 600 1000 2000 |
| D | .6702 .6702 .6292 |

INITIAL MEAN VALUE RDSON(O) = 2.26×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-1 DATE CODE 8237



MEAN IS OFF (NA)

DOSE, rads(Si) Co 60 Gammas

(11) IS OFF (NA) VS DOSE

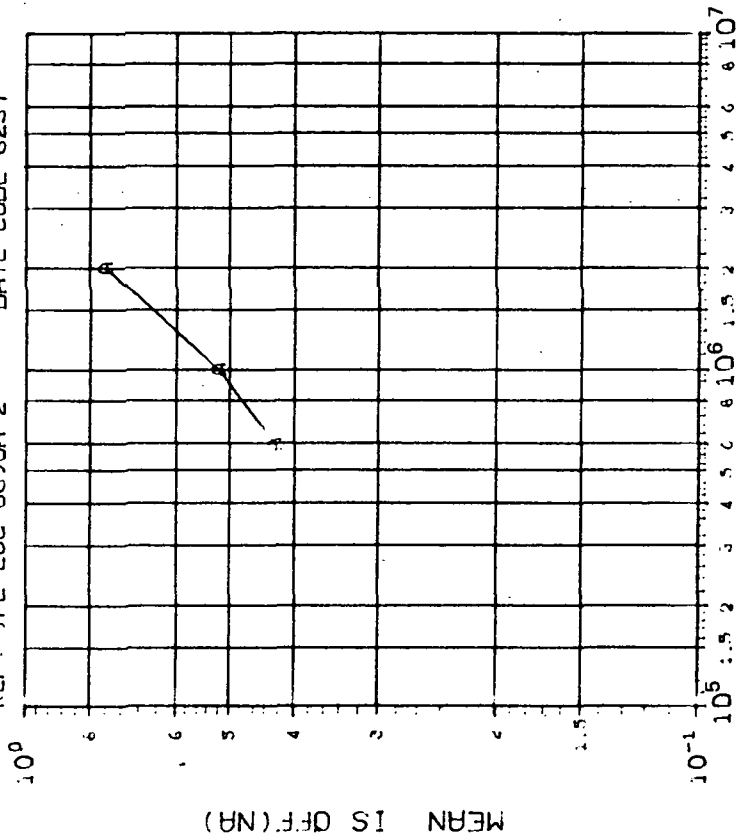
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| | .5222 .2281 .1996 |

INITIAL MEAN VALUE IS OFF (NA) = 6.65X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-2 DATE CODE 8237



MEAN IS OFF (NA)

DOSE, rads(Si) Co 60 Gammas

(11) IS OFF (NA) VS DOSE

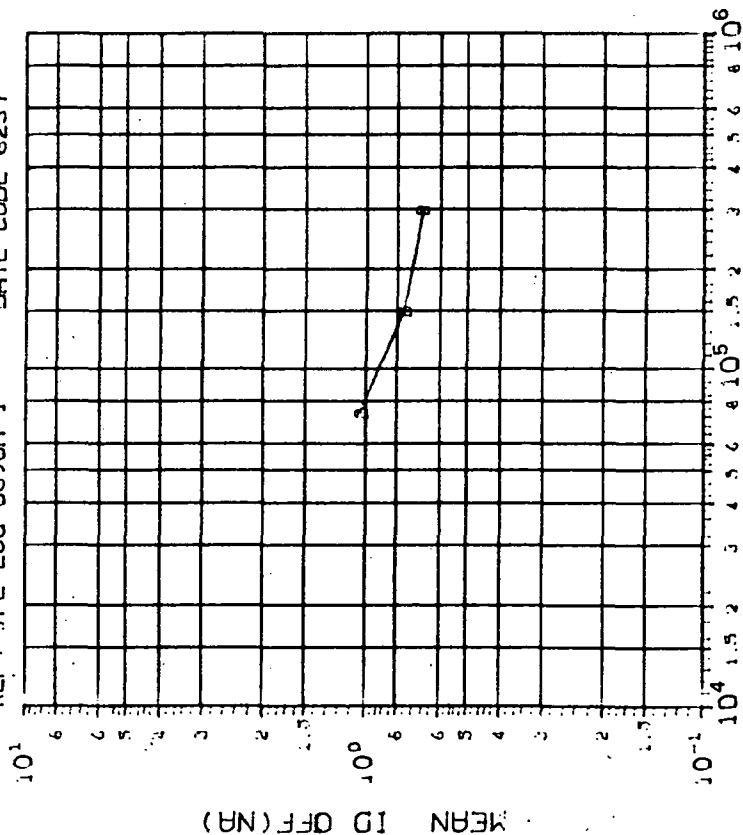
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| | .1486 .1020 .1431 |

INITIAL MEAN VALUE IS OFF (NA) = 6.65X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-1 DATE CODE 8237



DOSE, rads(Si) Co ⁶⁰ Gammas

(2) ID OFF (NA) VS DOSE

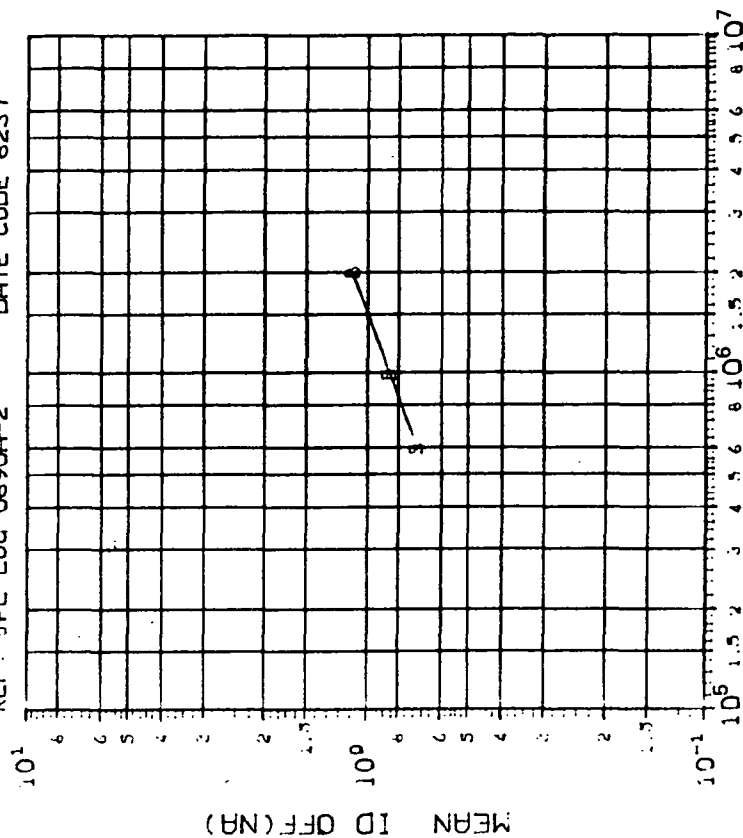
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 300 |
| | .6385 .5324 .4999 |

INITIAL MEAN VALUE ID OFF (NA) = 1.79X10⁻⁹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-2 DATE CODE 8237



DOSE, rads(Si) Co ⁶⁰ Gammas

(2) ID OFF (NA) VS DOSE

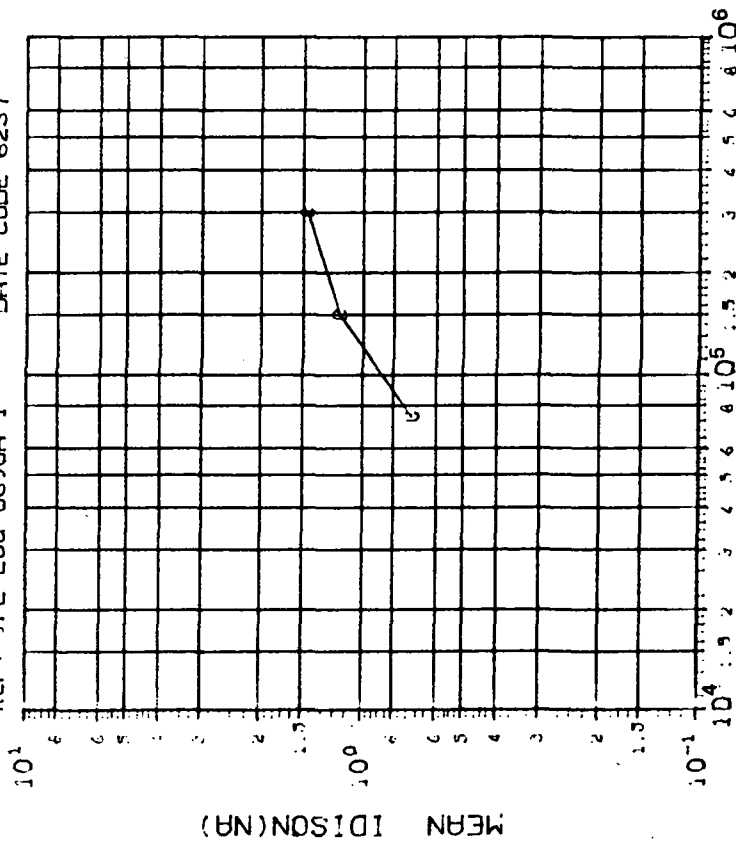
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| 5 | 600 |
| | 2000 |
| | .3315 .3295 .6873 |

INITIAL MEAN VALUE ID OFF (NA) = 1.79X10⁻⁹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(3)IDS ON (NA) VS DOSE

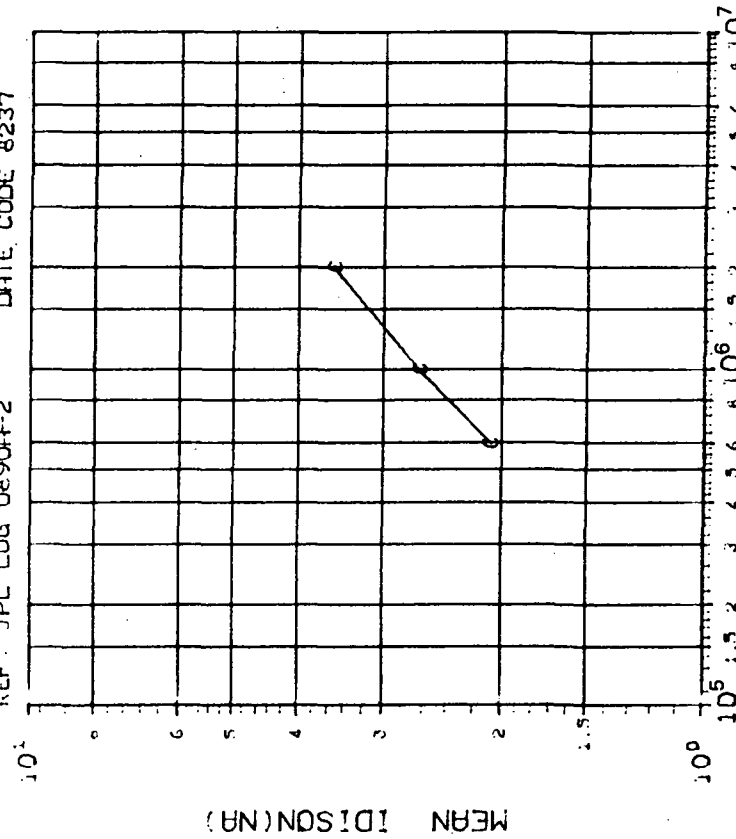
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| .9625 .7204 .1553 | |

INITIAL MEAN VALUE IDISON(NA) = 1.01×10^{-9}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(3)IDS ON (NA) VS DOSE

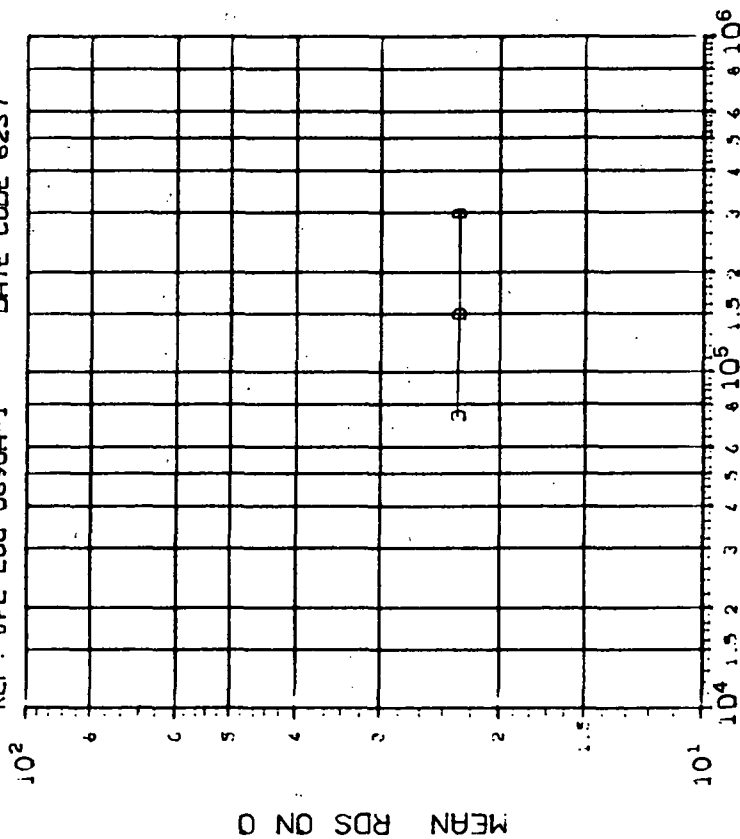
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| .6815 .6216 1.109 | |

INITIAL MEAN VALUE IDISON(NA) = 1.01×10^{-9}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: S1L 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-1 DATE CODE 8237



DOSE, rads(Si) Co⁶⁰ Gammas

(4)RDS ON 0 VS DOSE

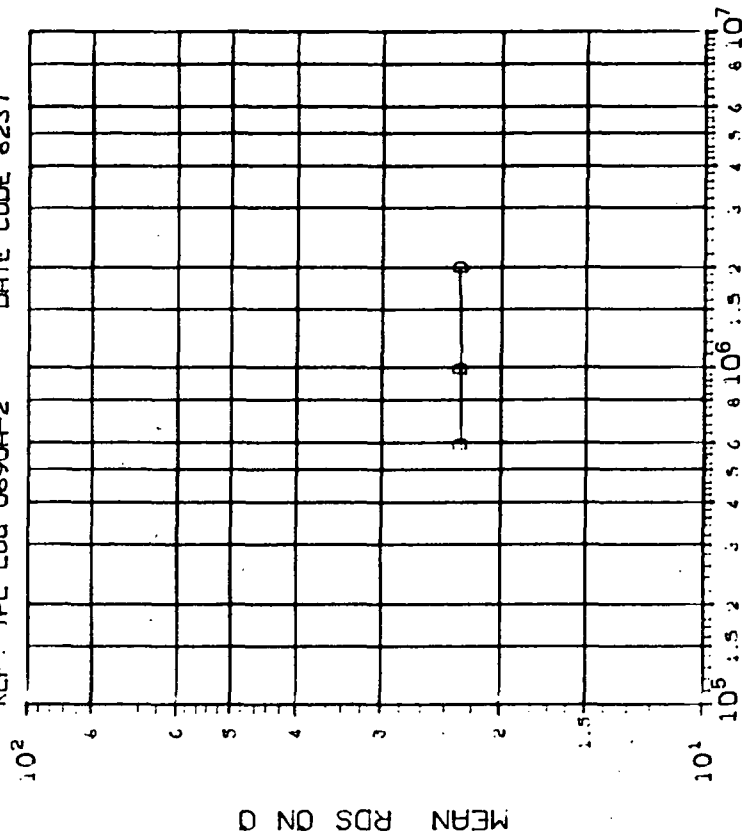
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| .5477 .5477 .5477 | |

INITIAL MEAN VALUE RDS ON 0 = 2.31X10¹¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: S1L 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890A-2 DATE CODE 8237



DOSE, rads(Si) Co⁶⁰ Gammas

(4)RDS ON 0 VS DOSE

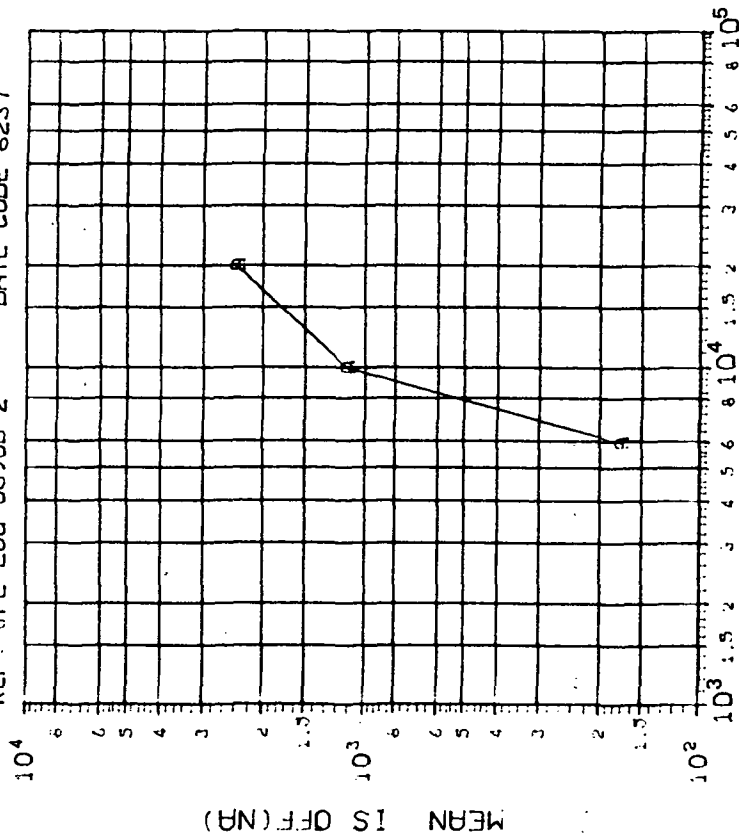
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 600 |
| | 1000 |
| | 2000 |
| .5745 .5745 .5477 | |

INITIAL MEAN VALUE RDS ON 0 = 2.31X10¹¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 08908-2 DATE CODE 8237



DOSE, rads(Si) Co ⁶⁰ Gammas

(1) IS OFF (NA) VS DOSE

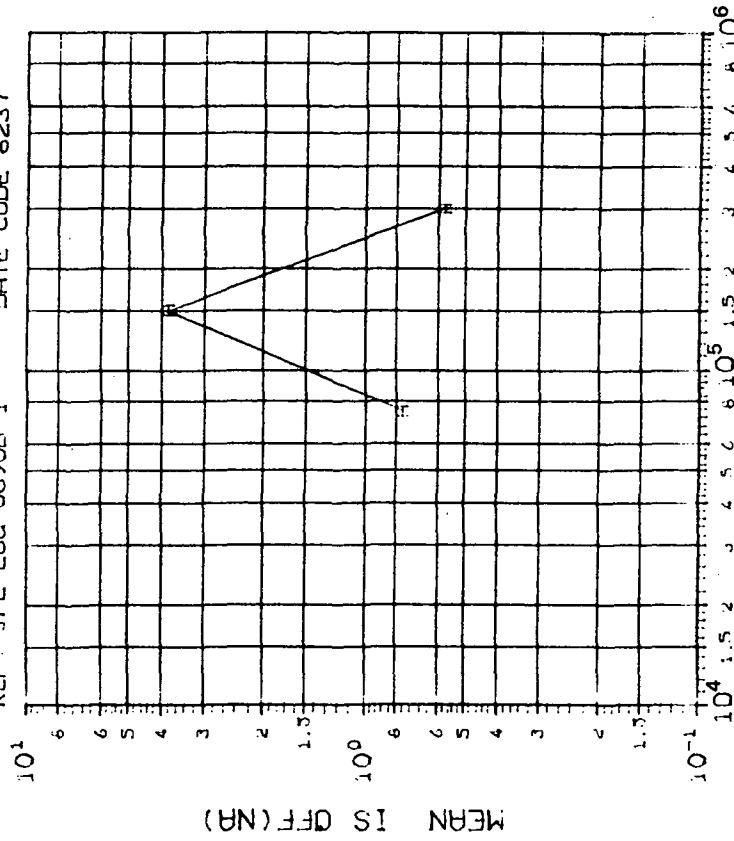
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-----------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 6 10 20 166.5 655.5 1239 |

INITIAL MEAN VALUE IS OFF(NA) = 5.67X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 08908-1 DATE CODE 8237



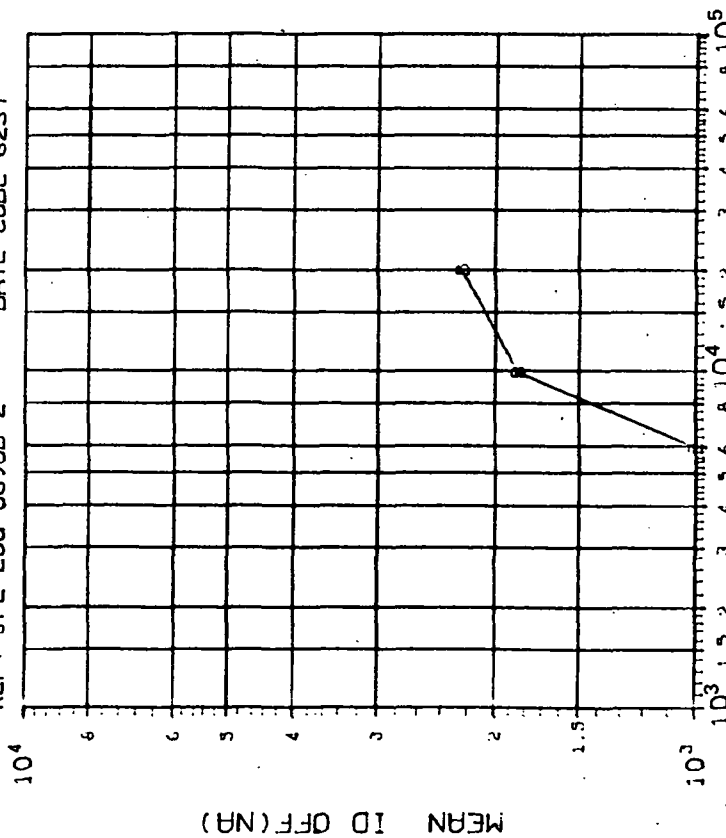
DOSE, rads(Si) Co ⁶⁰ Gammas

(1) IS OFF (NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|---------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 .3999 .6938 .1333 |

INITIAL MEAN VALUE IS OFF(NA) = 5.67X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)
MFG: SIL 4 DEVICES TEST DATE 6-26-83
REF: JPL LOG 0890B-2 DATE CODE 8237



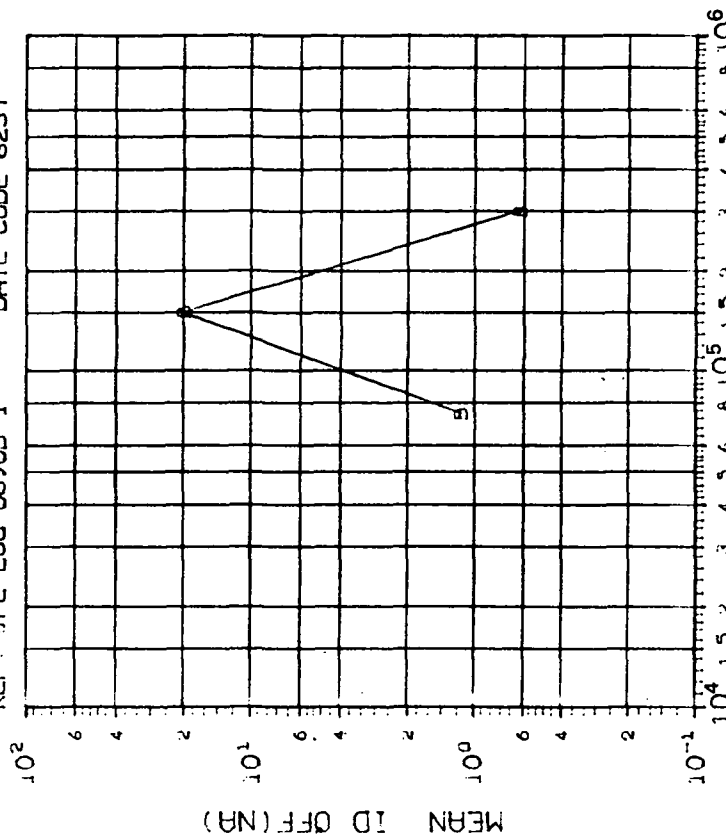
DOSE, rads(Si) Co 60 Gammas

(2) ID OFF (NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 6 10 20 |
| | 236.6 317.5 260.4 |

INITIAL MEAN VALUE ID OFF(NA) = 7.05X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)
MFG: SIL 4 DEVICES TEST DATE 6-26-83
REF: JPL LOG 0890B-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(2) ID OFF (NA) VS DOSE

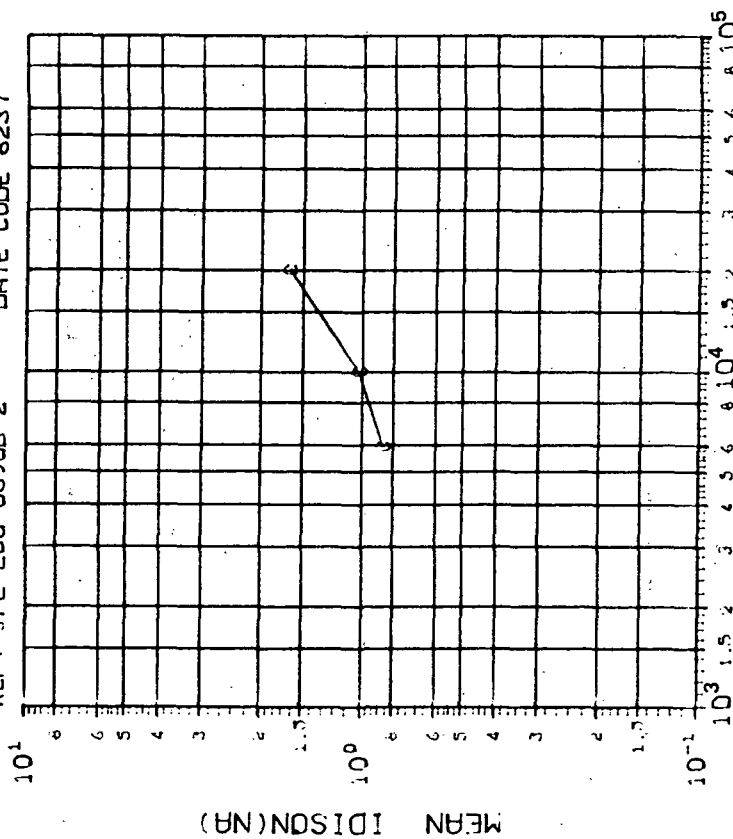
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 150 300 |
| | 3244 6.693 .1397 |

INITIAL MEAN VALUE ID OFF(NA) = 7.05X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

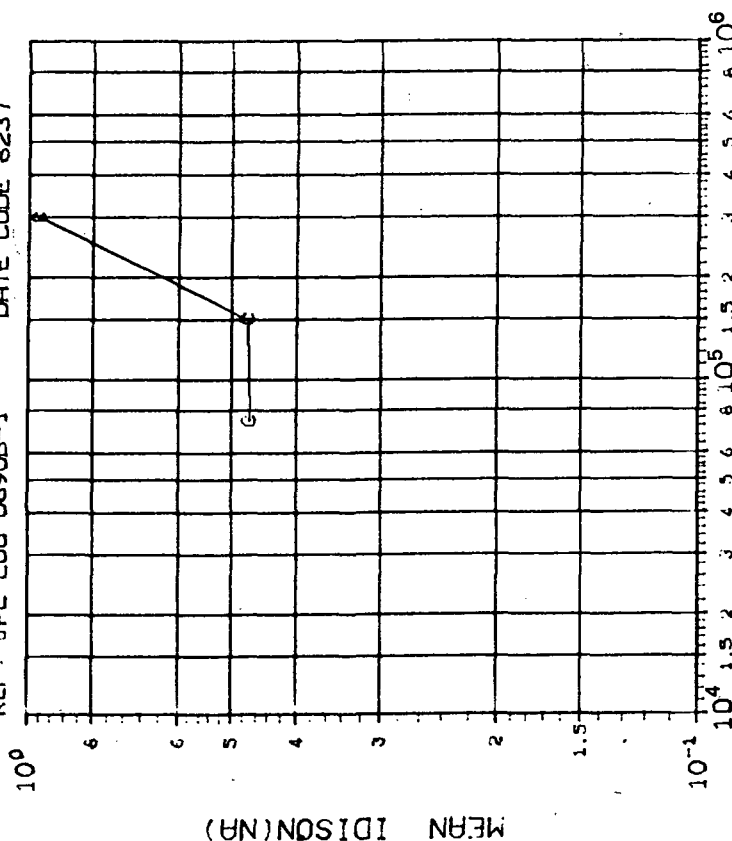
REF: JPL LOG 0890B-2 DATE CODE 8237



DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

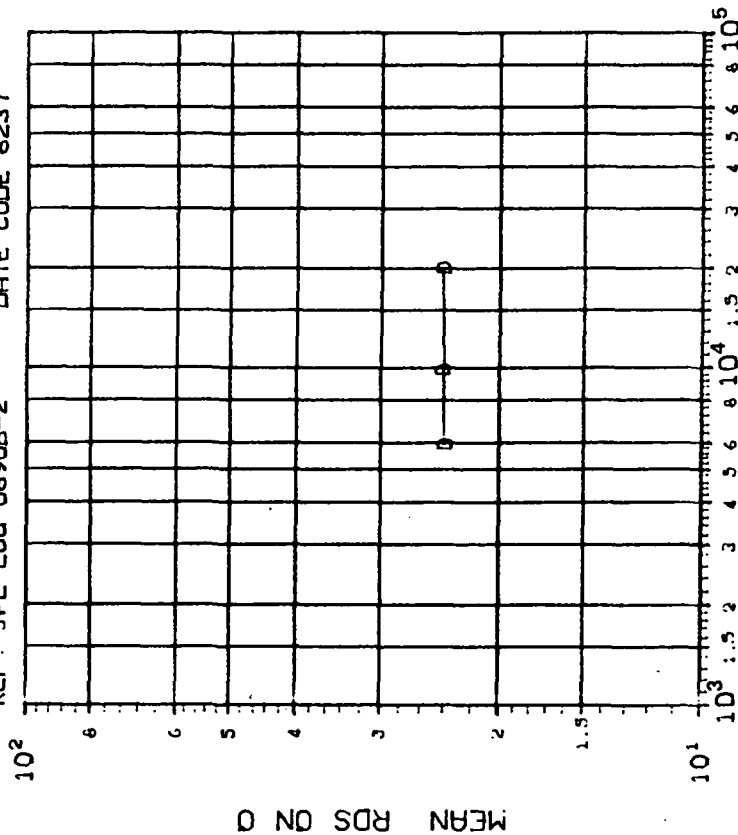
REF: JPL LOG 0890B-1 DATE CODE 8237



DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

REF: JPL LOG 0890B-2 DATE CODE 8237



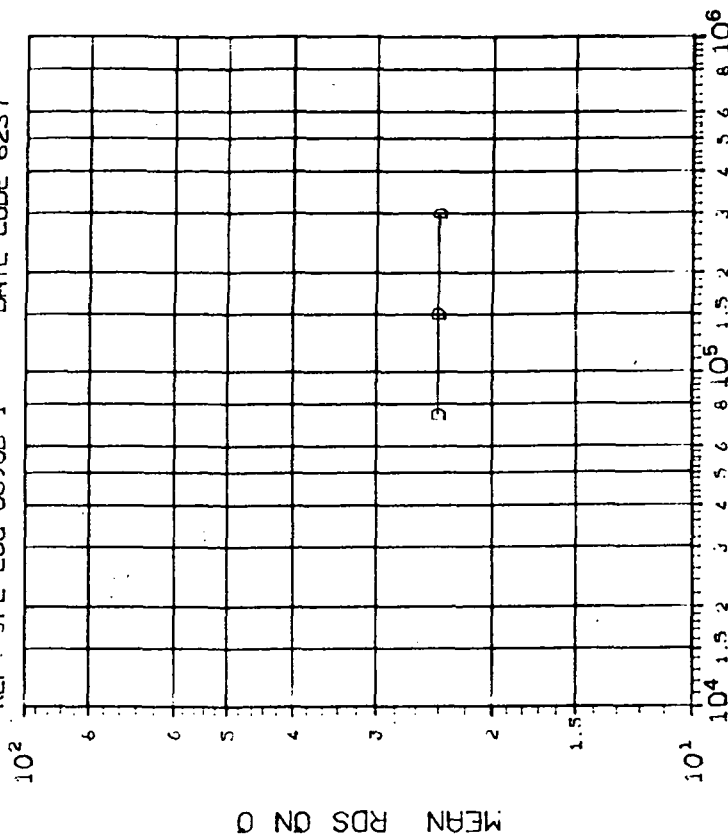
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 6 10 20 |
| | .7616 .7890 .8062 |

INITIAL MEAN VALUE RDS ON 0 = $2.37 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 4 DEVICES TEST DATE 6-26-83

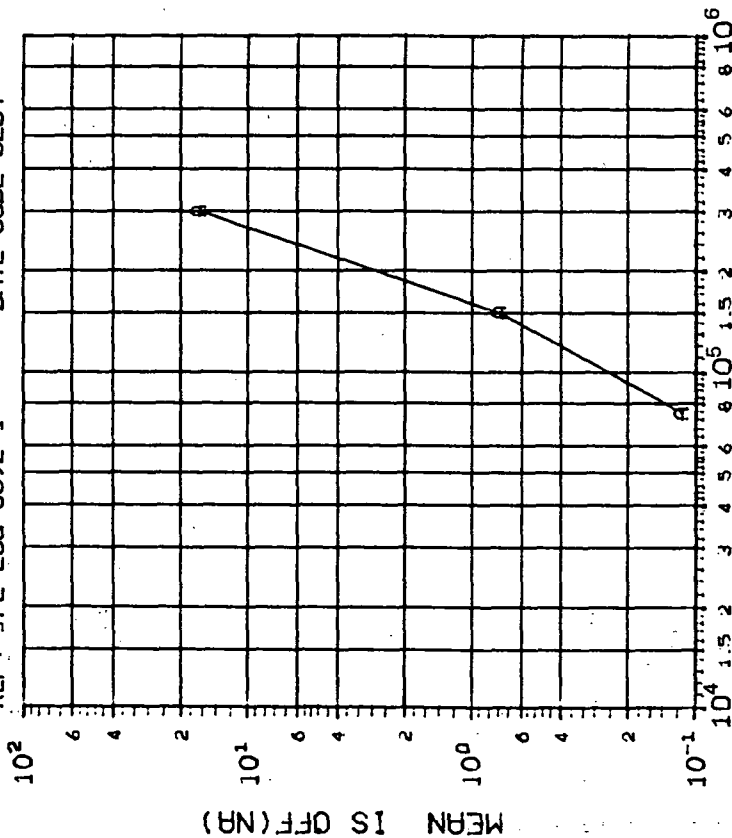
REF: JPL LOG 0890B-1 DATE CODE 8237



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 150 300 |
| | .6500 .6098 .7416 |

INITIAL MEAN VALUE RDS ON 0 = $2.37 \times 10^{+1}$

DEVICE TYPE: DG154 (DPST FET SWITCH)
MFG: SIL 6 DEVICES TEST DATE 05-02-83
REF: JPL LOG 0892-1 DATE CODE 8237



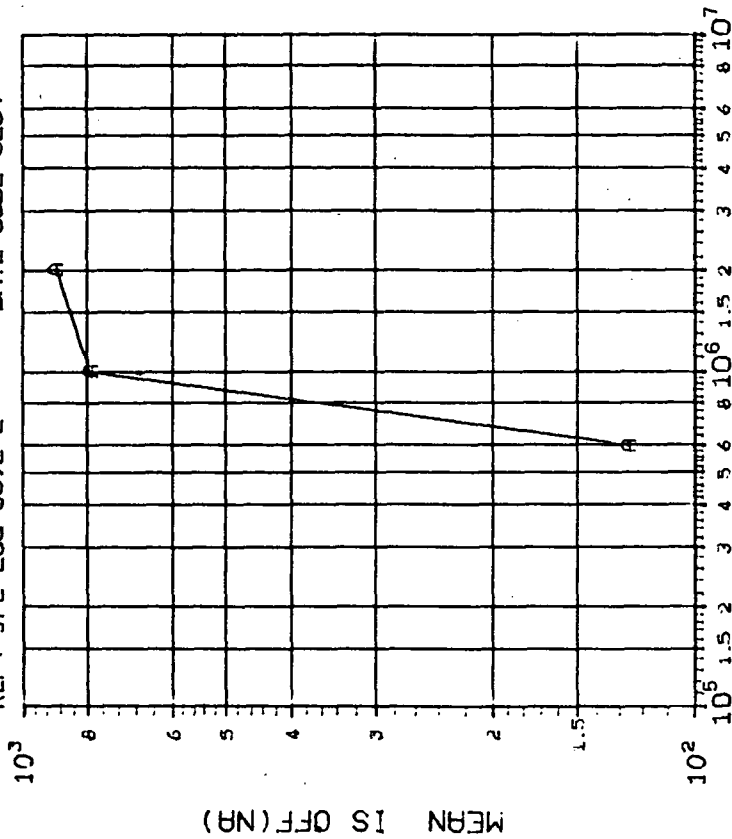
DOSE, rads(Si) Co 60 Gammas

(1) IS OFF (VS=7.5V, VD=-7.5V, VINE=0.6 VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| | .0683 .6796 22.68 |

INITIAL MEAN VALUE IS OFF(NA) = 2.07×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)
MFG: SIL 6 DEVICES TEST DATE 05-02-83
REF: JPL LOG 0892-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(1) IS OFF (VS=7.5V, VD=-7.5V, VINE=0.6 VS DOSE

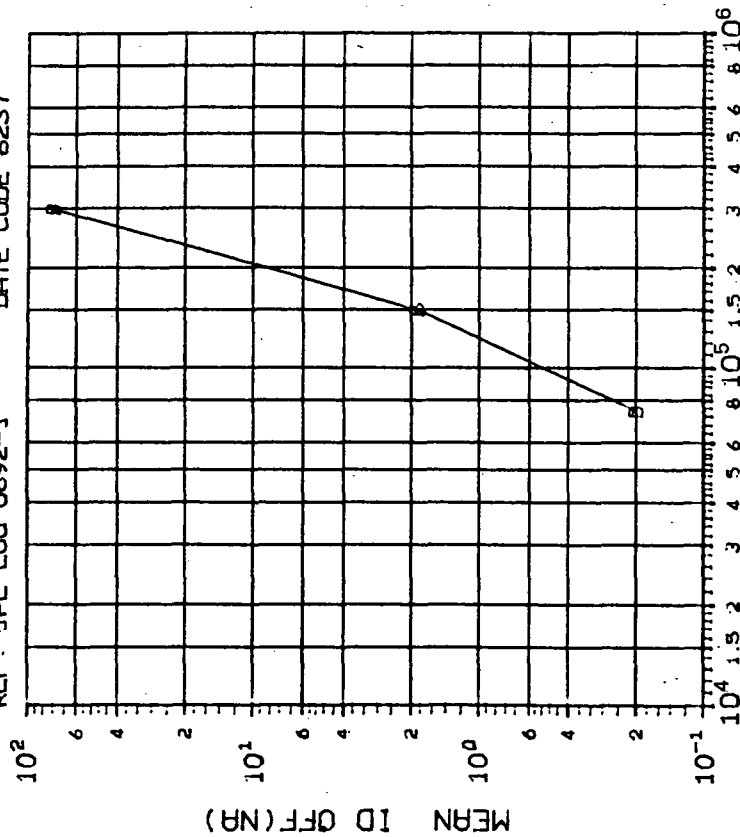
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| | 154.5 1206.978.9 |

INITIAL MEAN VALUE IS OFF(NA) = 2.07×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 6 DEVICES TEST DATE 05-02-83

REF: JPL LOG 0892-1 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(2) ID OFF (VD=-7.5V, VS=-7.5V, VIN=0.6 VS DOSE

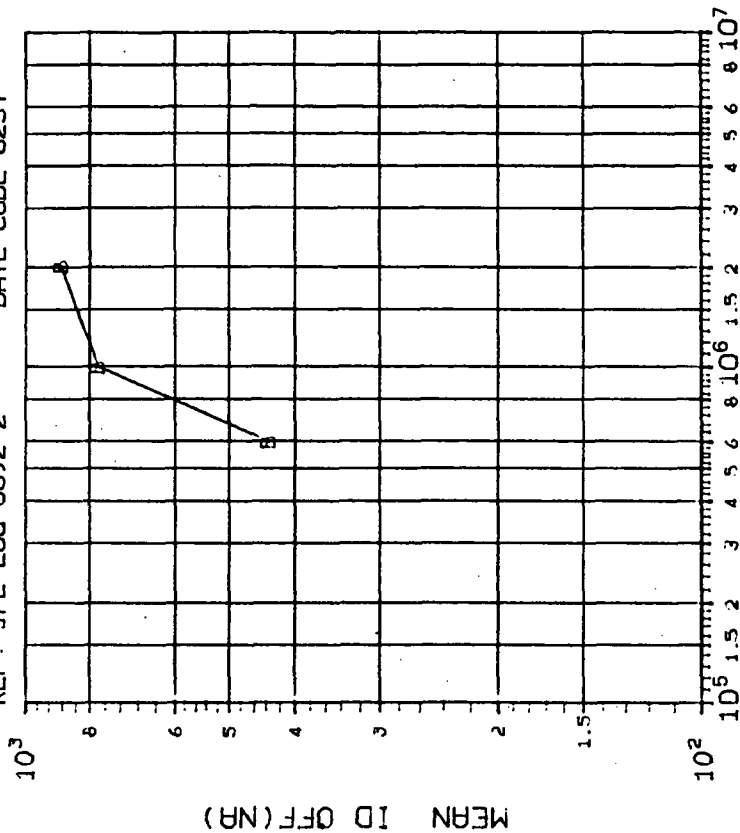
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 150 300 |
| | .1232 1.696 66.28 |

INITIAL MEAN VALUE ID OFF(NA) = 2.50X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SJL 6 DEVICES TEST DATE 05-02-83

REF: JPL LOG 0892-2 DATE CODE 8237



DOSE, rads(Si) Co 60 Gammas

(2) ID OFF (VD=-7.5V, VS=-7.5V, VIN=0.6 VS DOSE

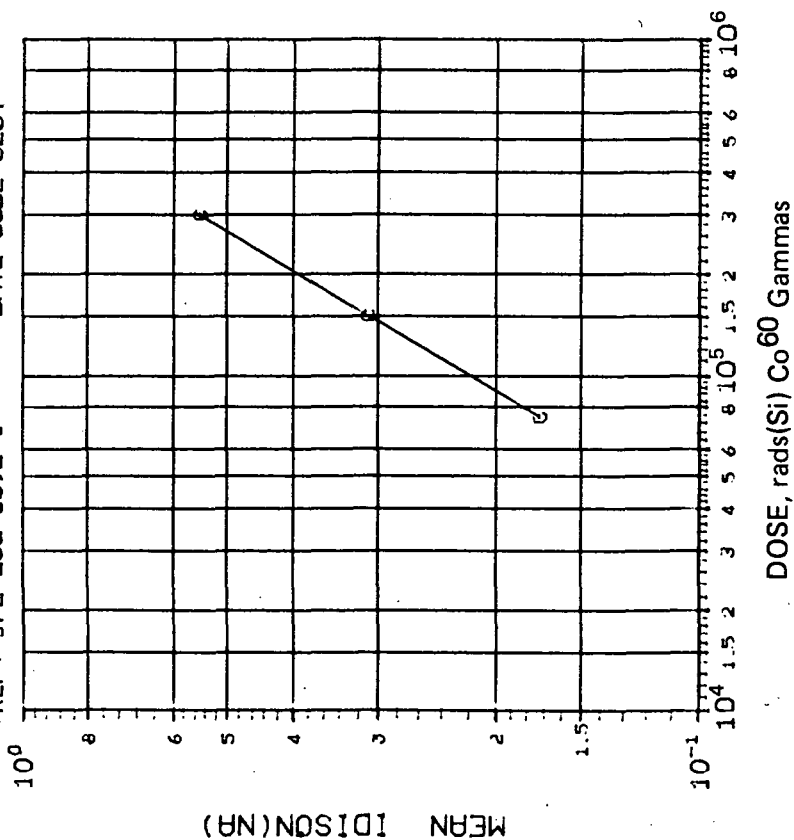
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 1000 2000 |
| | 482.6 670.2 994.1 |

INITIAL MEAN VALUE ID OFF(NA) = 2.50X10⁻¹

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 05-02-83

REF: JPL LOG 0892-1 DATE CODE 8237



(3) IDIS ON (VD=VS=-7.5V, VIN=2.5V) 1 VS DOSE

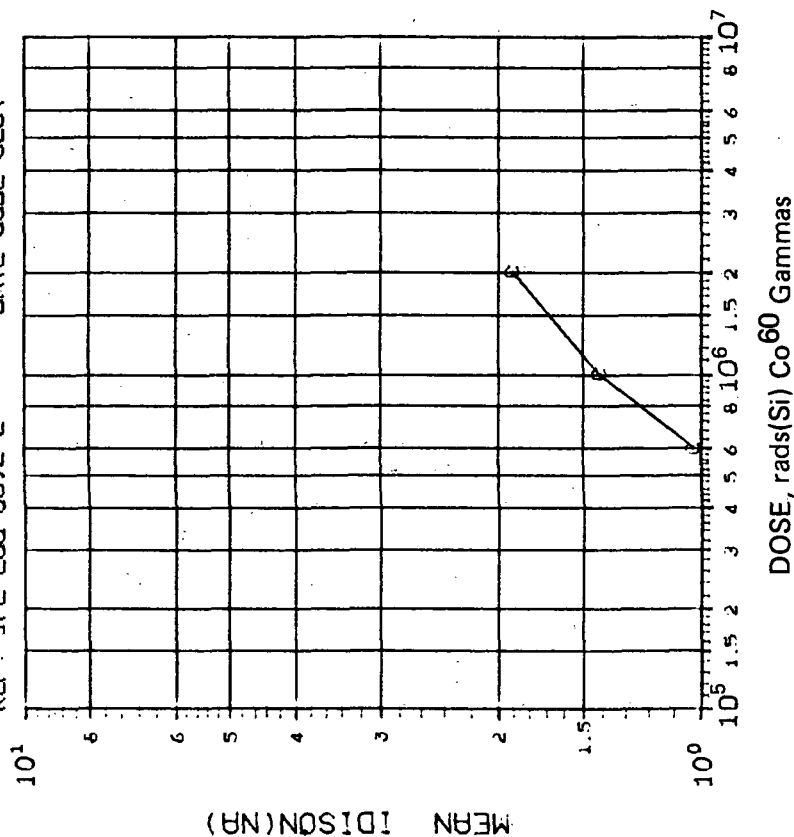
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | .1277 .1667 .3386 |

INITIAL MEAN VALUE IDISON(NA) = 2.13×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 05-02-83

REF: JPL LOG 0892-2 DATE CODE 8237



(3) IDIS ON (VD=VS=-7.5V, VIN=2.5V) 1 VS DOSE

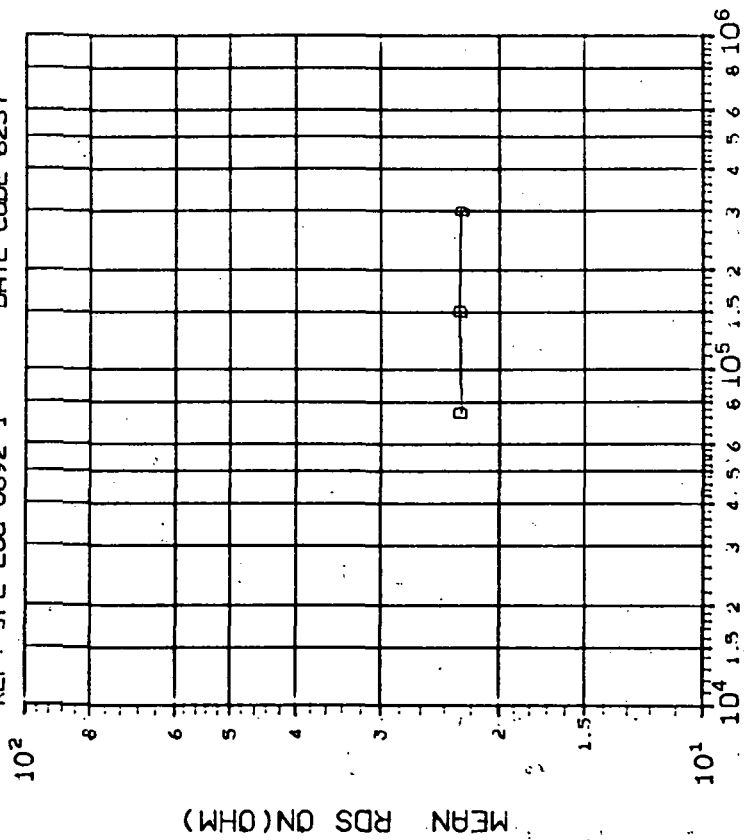
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| | .5685 .7524 .9702 |

INITIAL MEAN VALUE IDISON(NA) = 2.13×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 05-02-83

REF: JPL LOG 0892-1 DATE CODE 8237



DOSE, rads(Si) Co60 Gammas

(4) RDS ON (VD=10V, IS=-10mA, VIN=2.5V VS DOSE

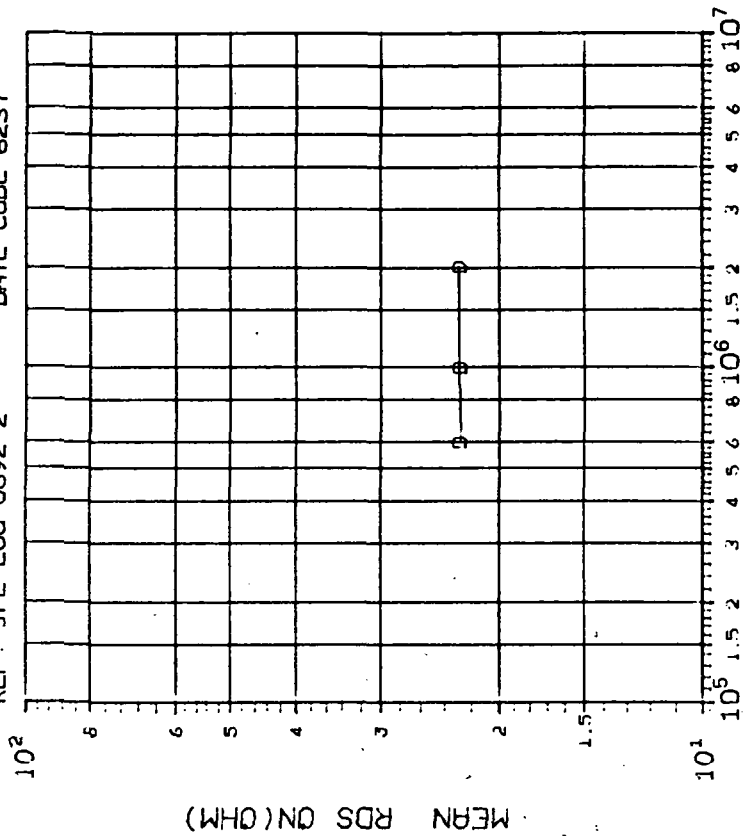
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| 1.011 1.023 1.009 | |

INITIAL MEAN VALUE RDS ON(OHM)= 2.27×10^{-1}

DEVICE TYPE: DG154 (DPST FET SWITCH)

MFG: SIL 6 DEVICES TEST DATE 05-02-83

REF: JPL LOG 0892-2 DATE CODE 8237



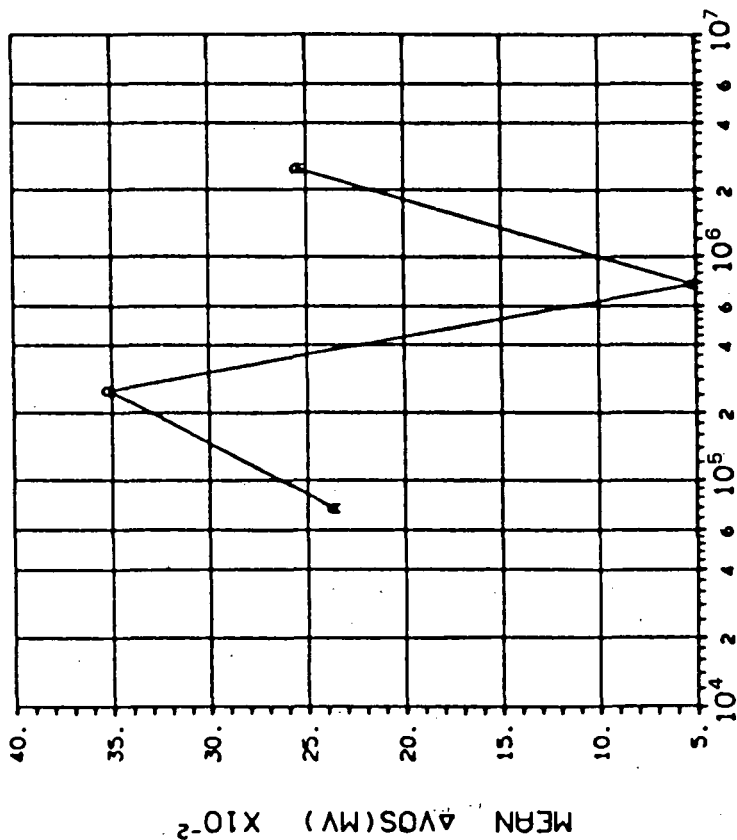
DOSE, rads(Si) Co60 Gammas

(4) RDS ON (VD=10V, IS=-10mA, VIN=2.5V VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 600 |
| | 1000 |
| | 2000 |
| 1.031 1.034 1.054 | |

INITIAL MEAN VALUE RDS ON(OHM)= 2.27×10^{-1}

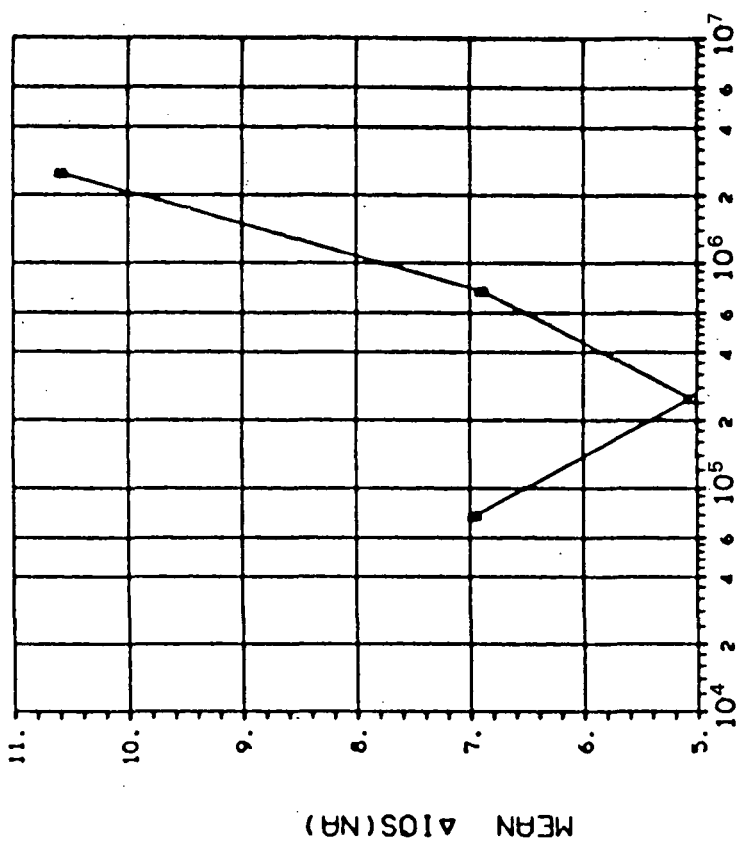
DEVICE TYPE: G159R(TA6678A) OP AMP
 MFG: RCA 3 DEVICES TEST DATE 9-18-81
 REF: JPL LOG 0766 DATE CODE 8114



DOSE, rads(Si) 2.5 MeV electrons
 (1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 250 |
| | 2500 |
| .0293 .2213 1.111 1.192 | |

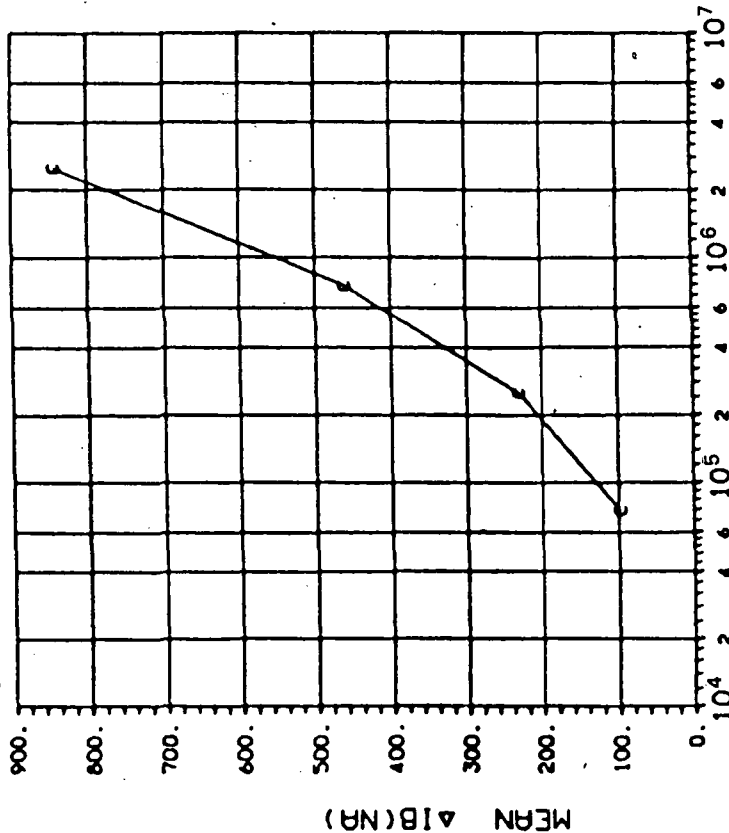
DEVICE TYPE: G159R(TA6678A) OP AMP
 MFG: RCA 3 DEVICES TEST DATE 9-18-81
 REF: JPL LOG 0766 DATE CODE 8114



DOSE, rads(Si) 2.5 MeV electrons
 (2)ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 250 |
| | 2500 |
| 13.31 17.99 30.82 53.86 | |

DEVICE TYPE: G159R(TA6678A) OP AMP
 MFG: RCA 3 DEVICES TEST DATE 9-18-81
 REF: JPL LOG 0766 DATE CODE 8114

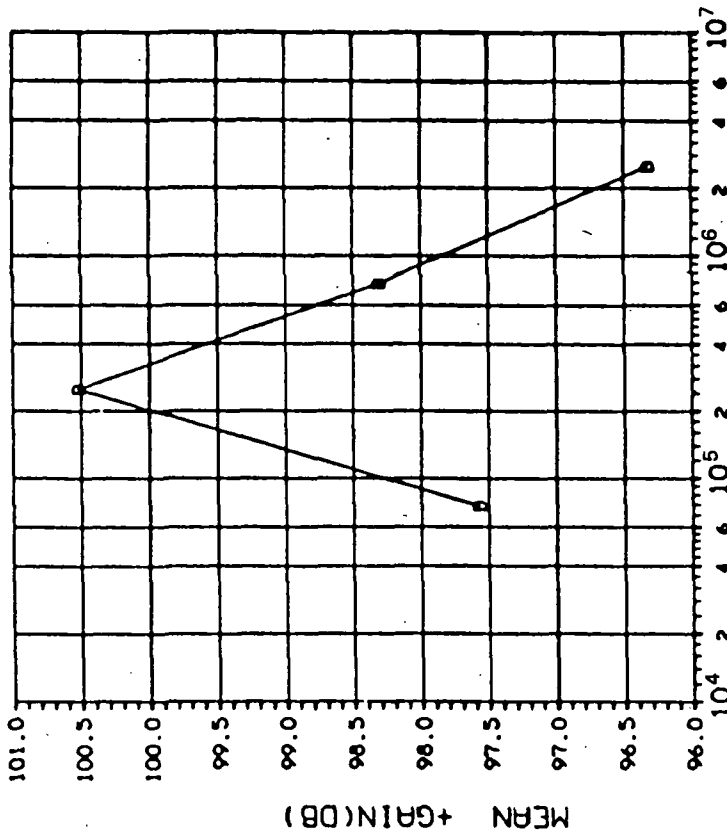


DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 250 750 2500 |
| C | 17.15 25.60 41.00 61.47 |

DEVICE TYPE: G159R(TA6678A) OP AMP
 MFG: RCA 3 DEVICES TEST DATE 9-18-81
 REF: JPL LOG 0766 DATE CODE 8114



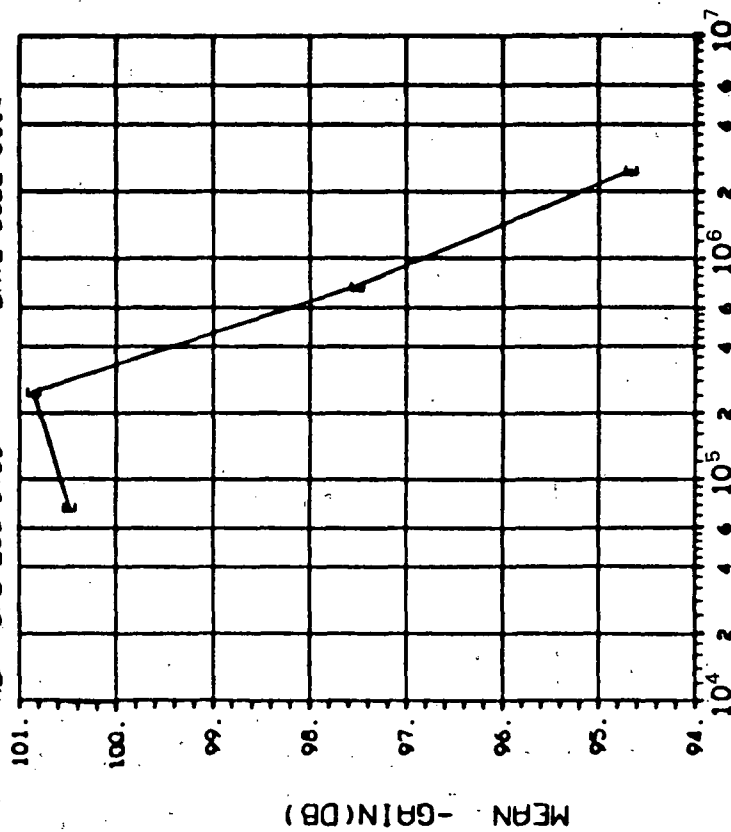
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(5MA, 100PF LOAD +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|------------------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 250 750 2500 |
| D | 5.00 9.171 4.510 1.907 .9387 |

INITIAL MEAN VALUE +GAIN(DB) = 1.04X10⁻³

DEVICE TYPE: G159R(TA6678A) OP AMP
 MFG: RCA 3 DEVICES TEST DATE 9-18-81
 REF: JPL LOG 0766 DATE CODE 8114



DOSE, rad(Si) 2.5 MeV electrons

(5)-GAIN(5MA,100PF LOAD -10V): VS DOSE

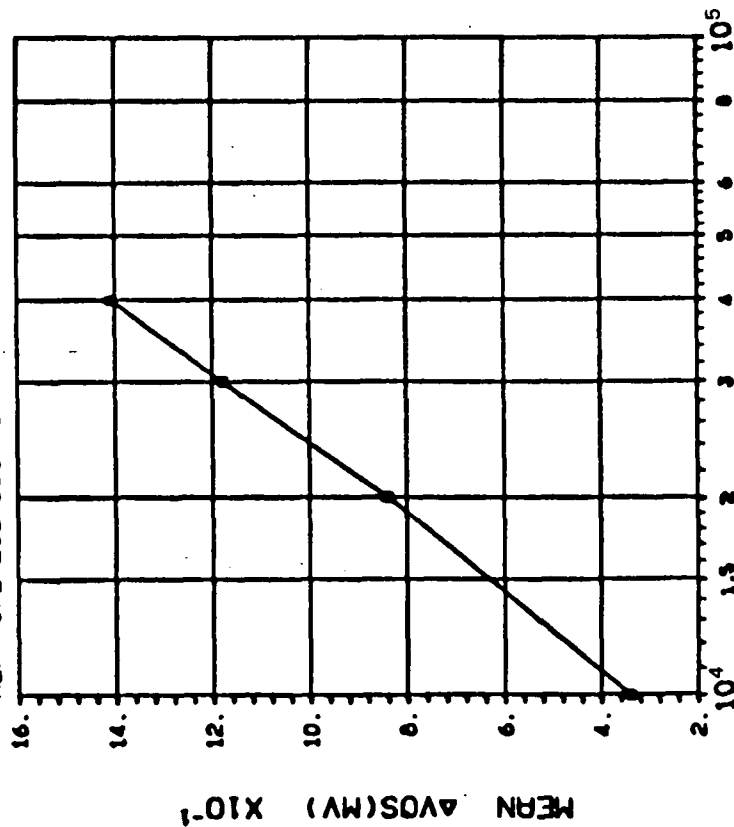
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 75 |
| | | 250 |
| | | 750 |
| | | 2500 |
| | | 1.329 .9632 1.770 .4700 |

INITIAL MEAN VALUE -GAIN(DB) = 1.02X10⁻²

DEVICE TYPE: HA2520 OP AMP

MFG: HAR 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-1 DATE CODE 7534



DOSE, rad(Si) 2.5 MeV electrons

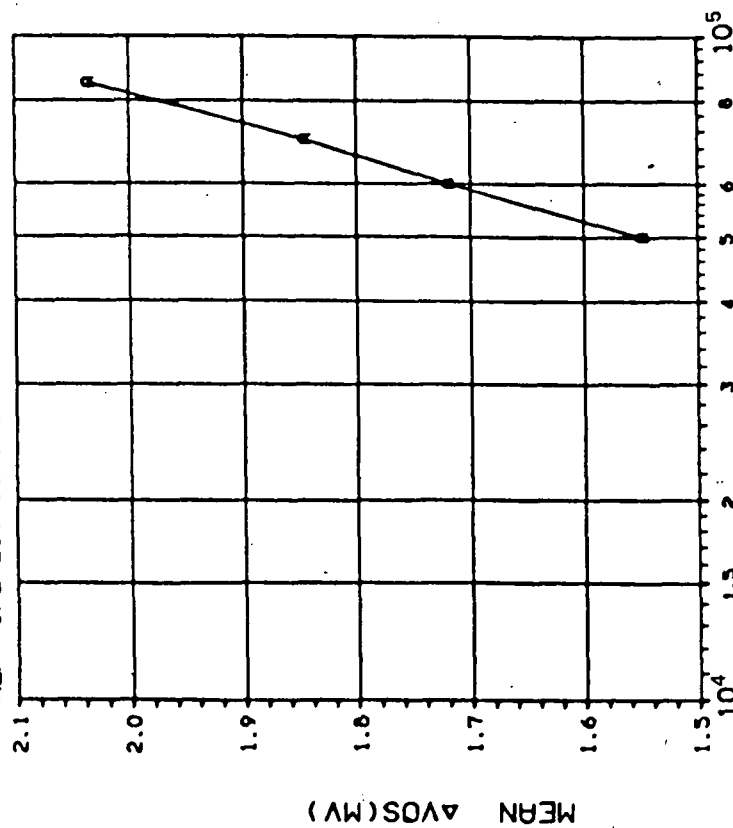
(1) ΔV_{OS} (MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 40 |
| A | .0801 | .0746 .0563 .0687 |

DEVICE TYPE: HA2520 OP AMP

MFG: HAR 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-2 DATE CODE 7534

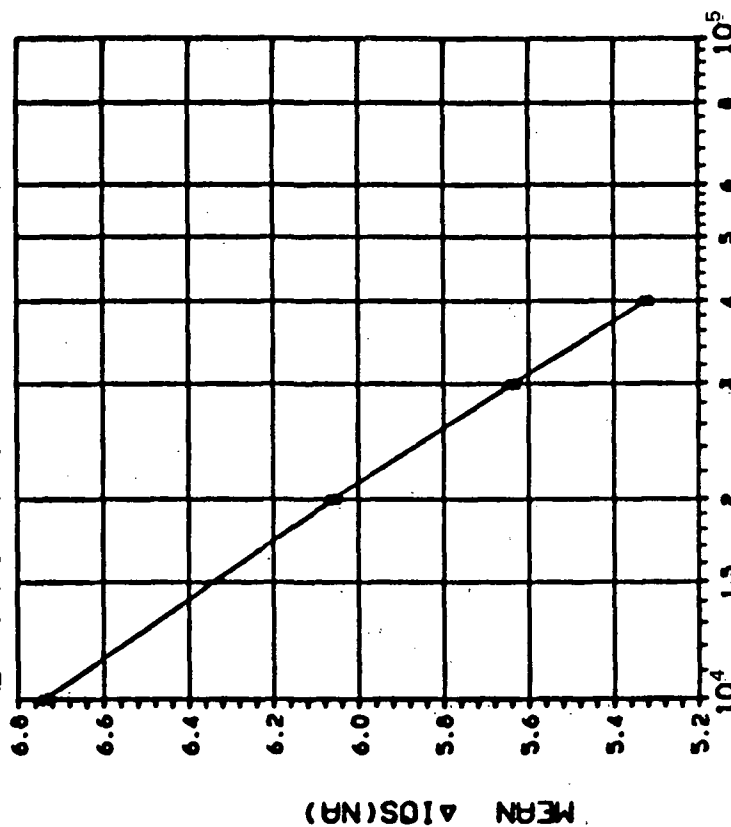


DOSE, rad(Si) 2.5 MeV electrons

(1) ΔV_{OS} (MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 50 | 60 70 85 |
| A | .0759 | .0775 .0671 .0794 |

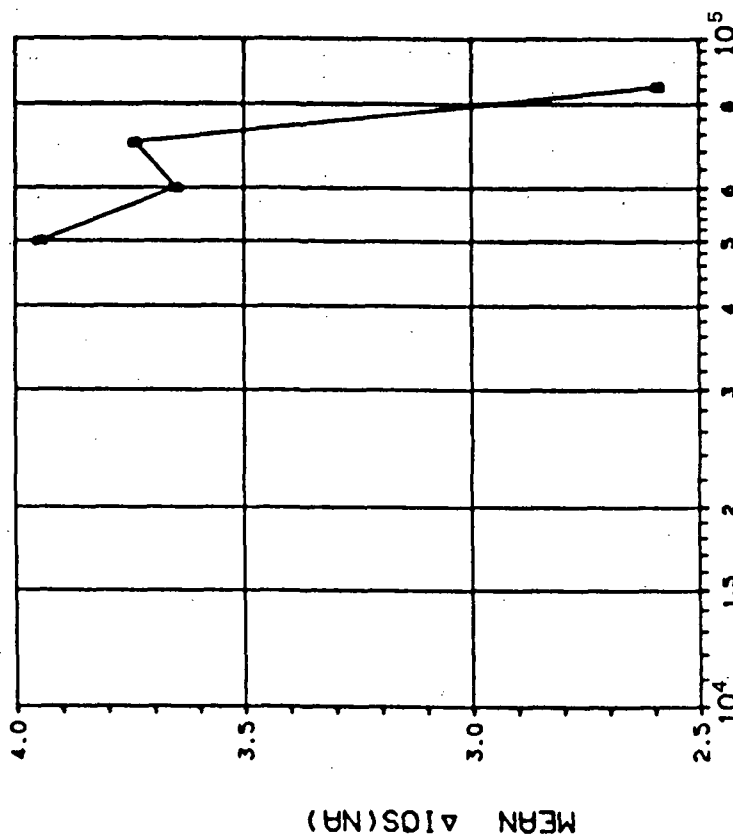
DEVICE TYPE: HR2520 OP AMP
MFG: HRR 3 DEVICES TEST DATE 5-5-82
REF: JPL LOG 0813-1 DATE CODE 7534



DOSE, rads(Si) 2.5 MeV electrons
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 20 30 40 |
| | 8.248 8.868 10.34 11.35 |

DEVICE TYPE: HR2520 OP AMP
MFG: HRR 3 DEVICES TEST DATE 5-5-82
REF: JPL LOG 0813-2 DATE CODE 7534



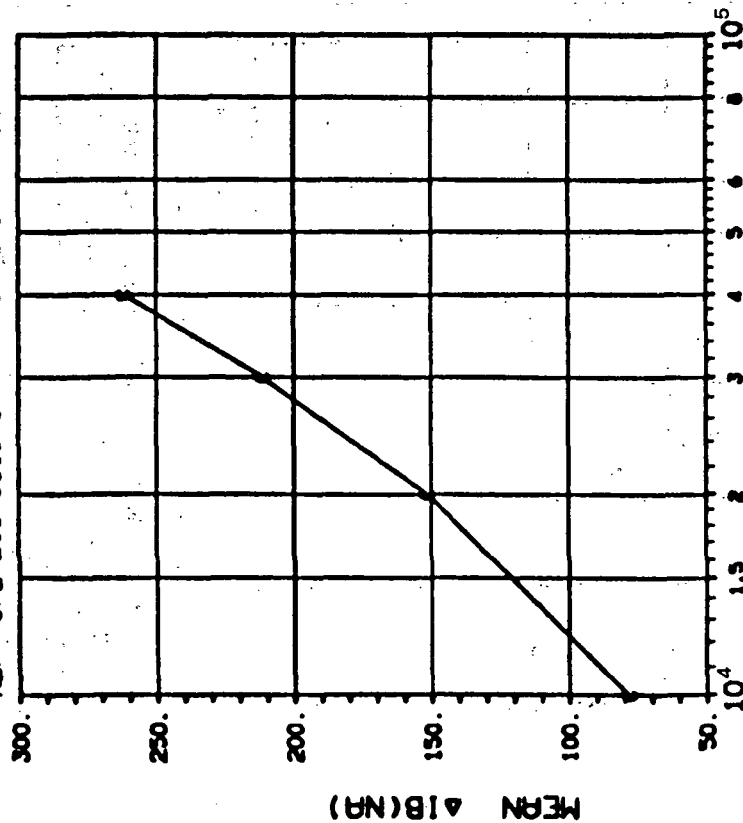
DOSE, rads(Si) 2.5 MeV electrons
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 50 60 70 85 |
| | 11.60 12.20 12.84 9.517 |

DEVICE TYPE: HA2520 OP AMP

MFG: HRR 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-1 DATE CODE 7534



DOSE, rad(Si) 2.5 MeV electrons

(3) $\Delta IB(NA)$: VS DOSE

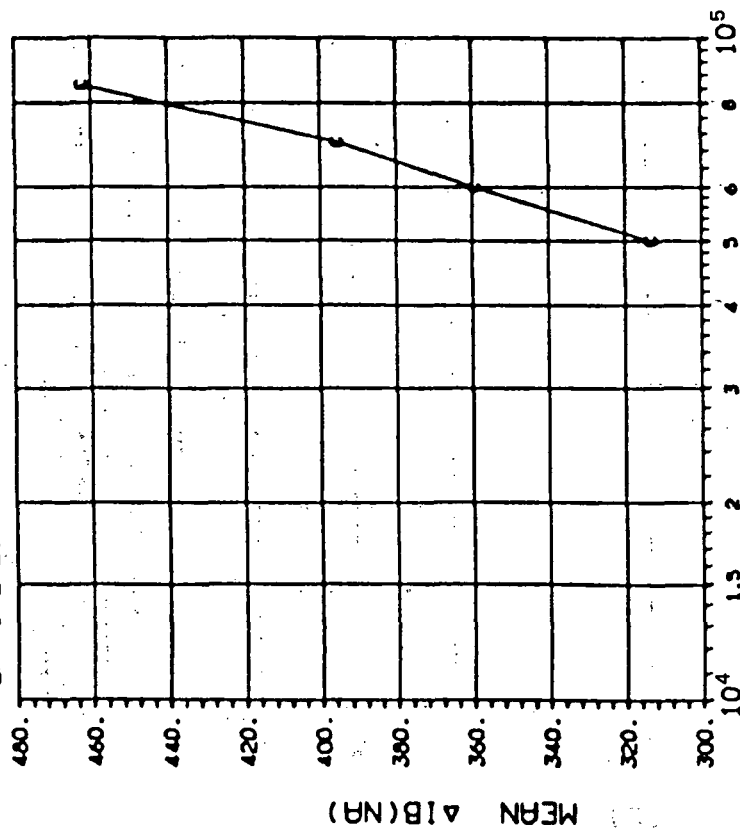
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------|
| | 10 | 20 | 30 | 40 |
| C | 4.900 | 6.770 | 11.27 | 12.96 |

DEVICE TYPE: HA2520 OP AMP

MFG: HRR 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-2 DATE CODE 7534



DOSE, rad(Si) 2.5 MeV electrons

(3) $\Delta IB(NA)$: VS DOSE

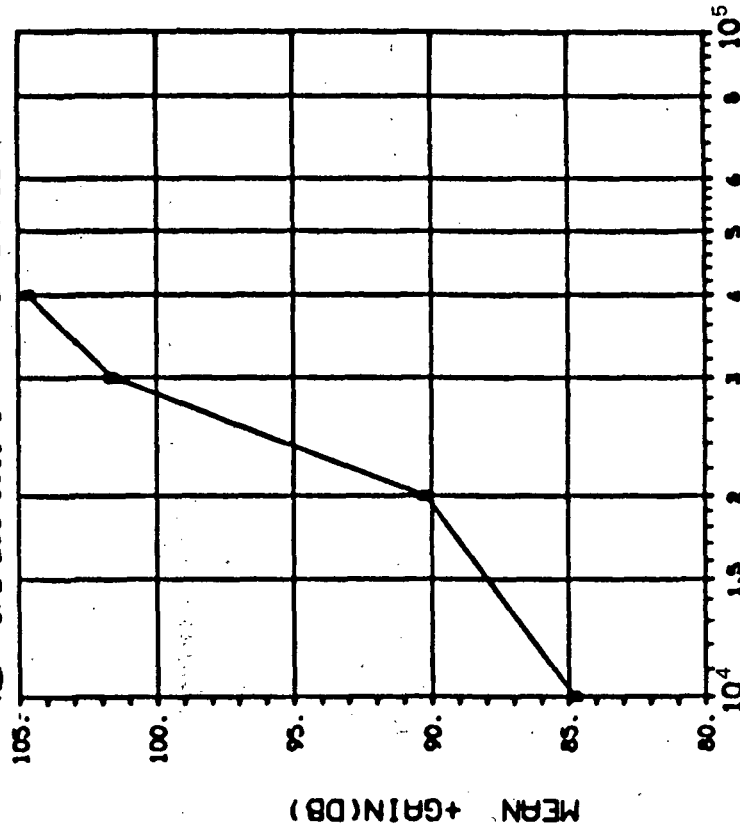
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------|
| | 50 | 60 | 70 | 85 |
| C | 23.19 | 37.26 | 34.58 | 35.08 |

DEVICE TYPE: H42520 OP AMP

MFG: H4R 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-1 DATE CODE 7534



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(10MA LOAD, +5V)DB: VS DOSE

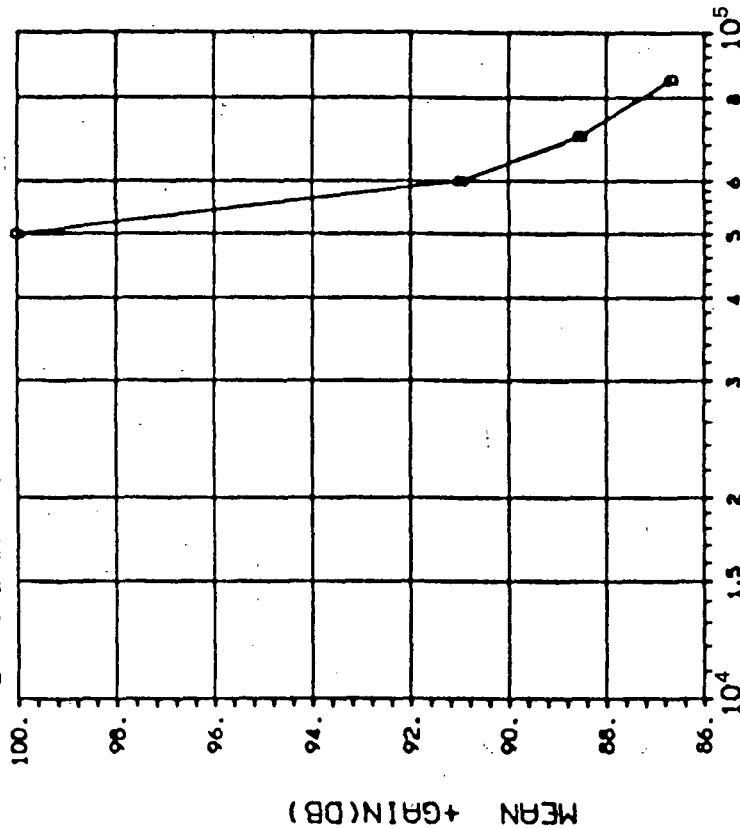
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-----------------------|--------------------------|
| CURVE | I _L (A) | DOSE, kilorads(Si) |
| D | 10.0 | 1.112 0.9923 3.025 8.071 |

INITIAL MEAN VALUE +GAIN(DB) = 8.61X10⁻¹

DEVICE TYPE: H42520 OP AMP

MFG: H4R 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-2 DATE CODE 7534



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(10MA LOAD, +5V)DB: VS DOSE

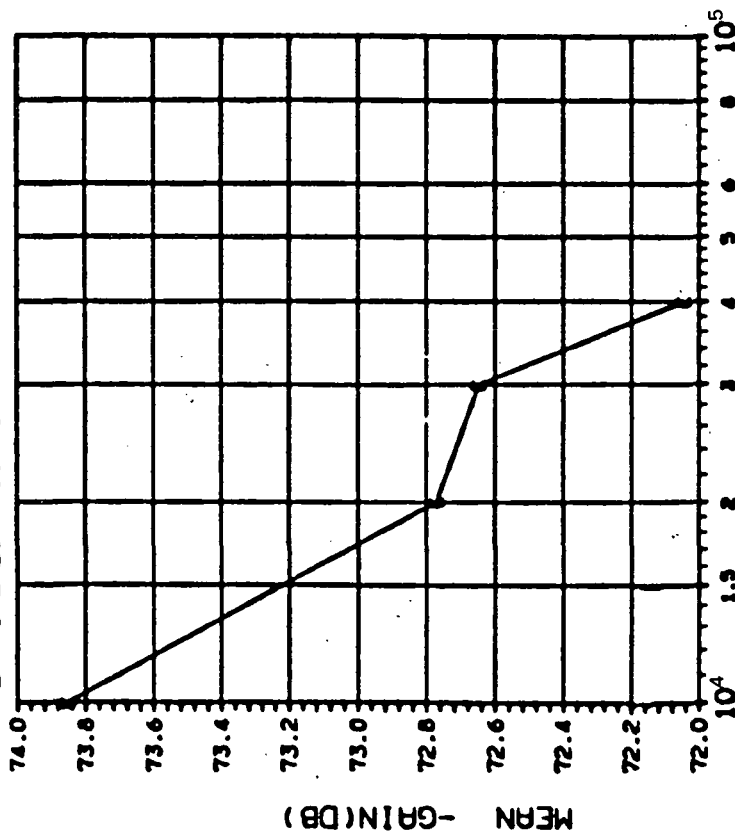
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-----------------------|-------------------------|
| CURVE | I _L (A) | DOSE, kilorads(Si) |
| D | 10.0 | 6.021 .9143 2.276 1.119 |

INITIAL MEAN VALUE +GAIN(DB) = 8.61X10⁻¹

DEVICE TYPE: H42520 OP AMP

MFG: HRR 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-1 DATE CODE 7534



DOSE, rad(Si) 2.5 MeV electrons

(5)-GAIN(10MA LOAD, -5V)DB: VS DOSE

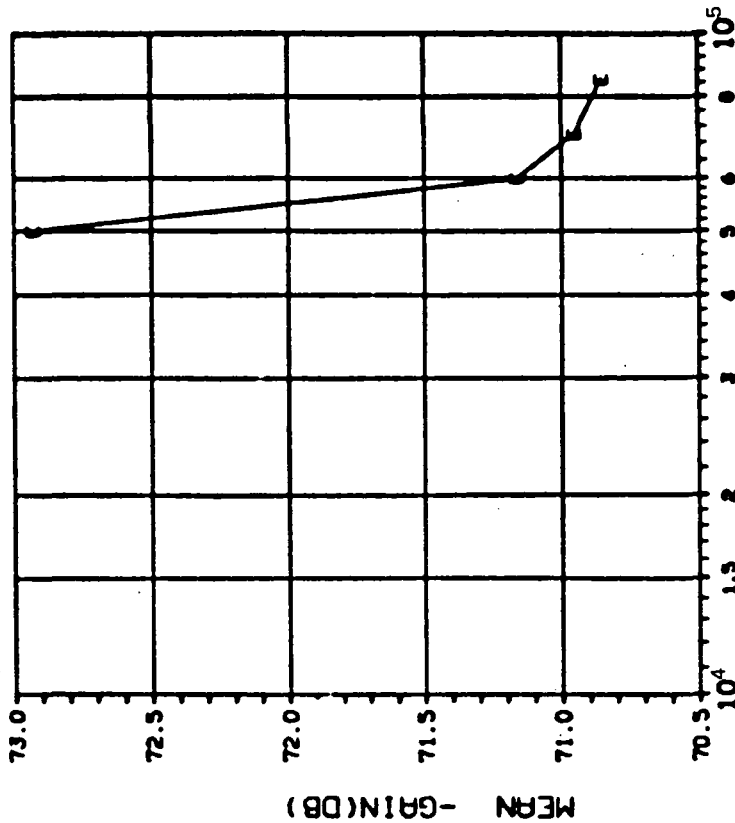
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-----------------------|-------------------------|
| CURVE | I _L (A) | DOSE, kilorads(Si) |
| E | 10.0 | .6462 .3779 .4591 .3476 |

INITIAL MEAN VALUE -GAIN(DB) = 7.40X10⁻¹

DEVICE TYPE: H42520 OP AMP

MFG: HRR 3 DEVICES TEST DATE 5-5-82

REF: JPL LOG 0813-2 DATE CODE 7534



DOSE, rad(Si) 2.5 MeV electrons

(5)-GAIN(10MA LOAD, -5V)DB: VS DOSE

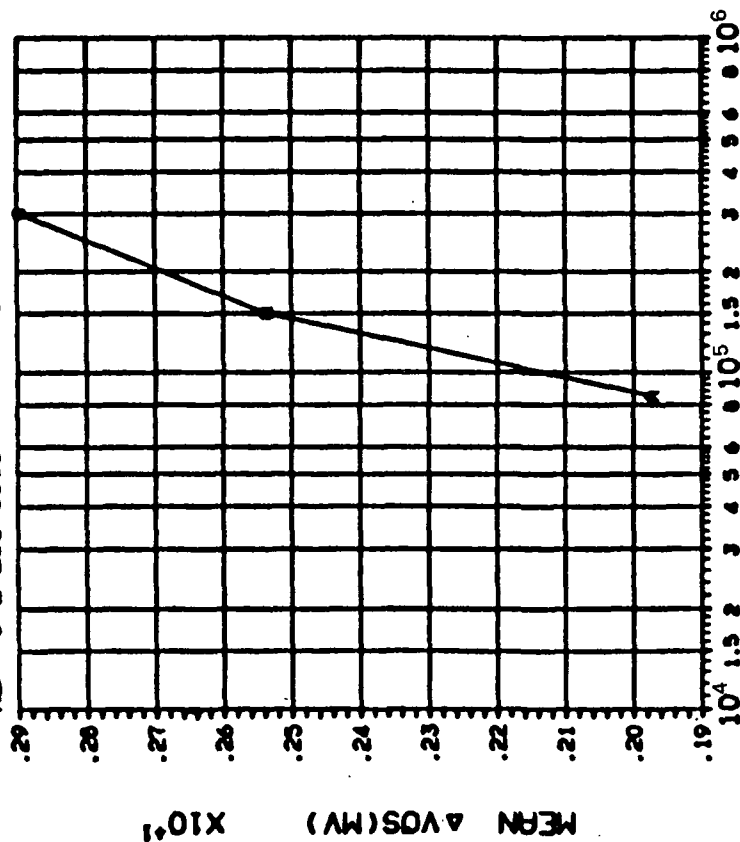
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-----------------------|-------------------------|
| CURVE | I _L (A) | DOSE, kilorads(Si) |
| E | 10.0 | 2.131 .1824 .1760 .1760 |

INITIAL MEAN VALUE -GAIN(DB) = 7.40X10⁻¹

DEVICE TYPE: HA2520 OP AMP

MFG: HRR 3 DEVICES TEST DATE 5-21-82

REF: JPL LOG 0815 DATE CODE 7534



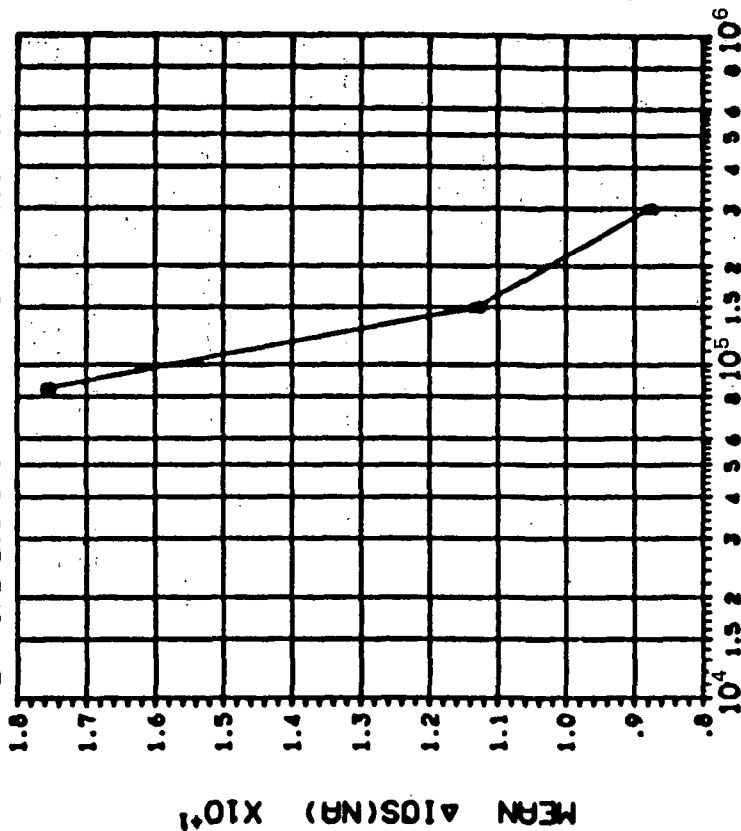
DOSE, rads(Si) 2.5 MeV electrons
(1) $\Delta VOS(MV)$ VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 85 |
| | 150 |
| | 300 |
| .1646 .2922 .1221 ***** | |

DEVICE TYPE: HA2520 OP AMP

MFG: HRR 3 DEVICES TEST DATE 5-21-82

REF: JPL LOG 0815 DATE CODE 7534



DOSE, rads(Si) 2.5 MeV electrons
(2) $\Delta IOS(NA)$ VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 85 |
| | 150 |
| | 300 |
| 5.086 3.846 0.044 ***** | |

DEVICE TYPE: H82520 OP AMP

MFG: HAR 3 DEVICES TEST DATE 5-21-82

REF: JPL LOG 0815 DATE CODE 7534



DOSE, rads(Si) 2.5 MeV electrons

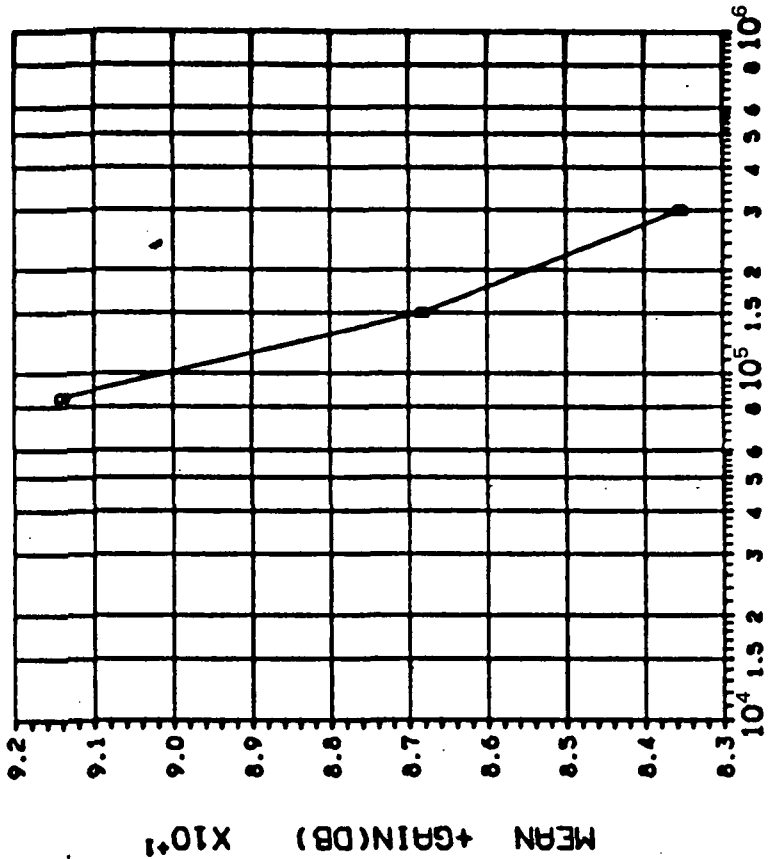
(3) ΔIB(NR): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 85 | 150 300 600 |
| C | 29.08 | 17.51 36.25 ***** |

DEVICE TYPE: H82520 OP AMP

MFG: HAR 3 DEVICES TEST DATE 5-21-82

REF: JPL LOG 0815 DATE CODE 7534



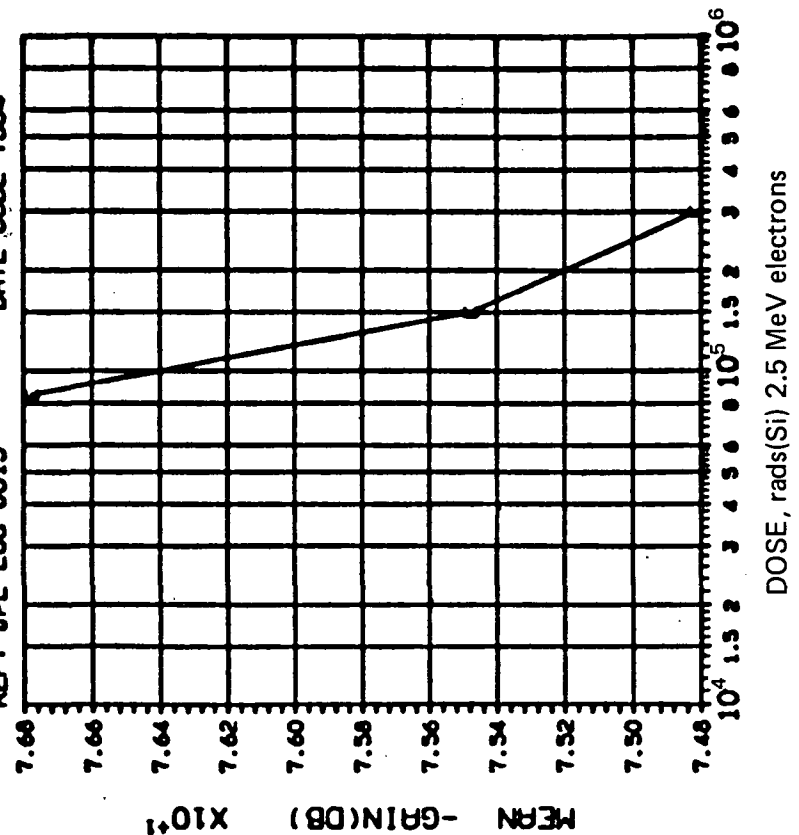
DOSE, rads(Si) 2.5 MeV electrons

(4) +GAIN(10MA LOAD, +5V)DB: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| | | 85 150 300 600 |
| D | 10.0 | 2.261 1.185 .7730 ***** |

INITIAL MEAN VALUE +GAIN(DB) = 9.22X10⁻¹

DEVICE TYPE: HR2520 OP APP
 MFG: HRR 3 DEVICES TEST DATE 5-21-82
 REF: JPL LOG 0815 DATE CODE 7534



(5)-GAIN(10MA LOAO, -5V)DB: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 10.0 | 85 150 300 600 |
| | | .2996 .1497 .1374 ##### |

INITIAL MEAN VALUE -GAIN(DB) = 8.00X10⁻⁴

DEVICE TYPE: HA2700 OP AMP

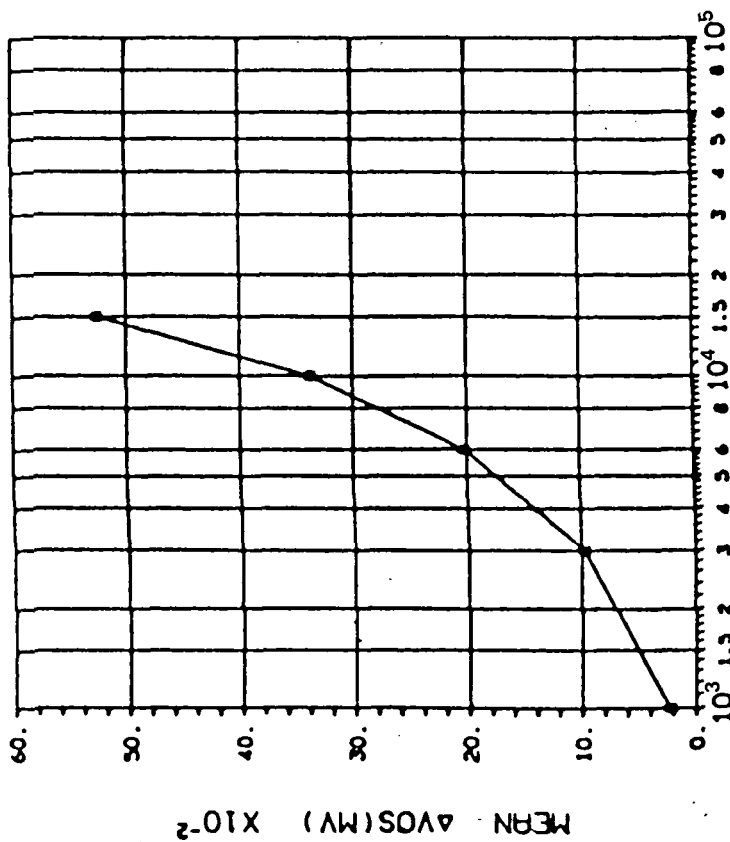
MFG: HAR

4 DEVICES

TEST DATE 10-21-81

REF: JPL LOG 0794-1

DATE CODE NONE



DOSE, rad(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 1 | 3 | 6 |
| A | .0321 | .0403 | .0626 |
| | 10 | 15 | |
| | .1214 | .2025 | |

DEVICE TYPE: HA2700 OP AMP

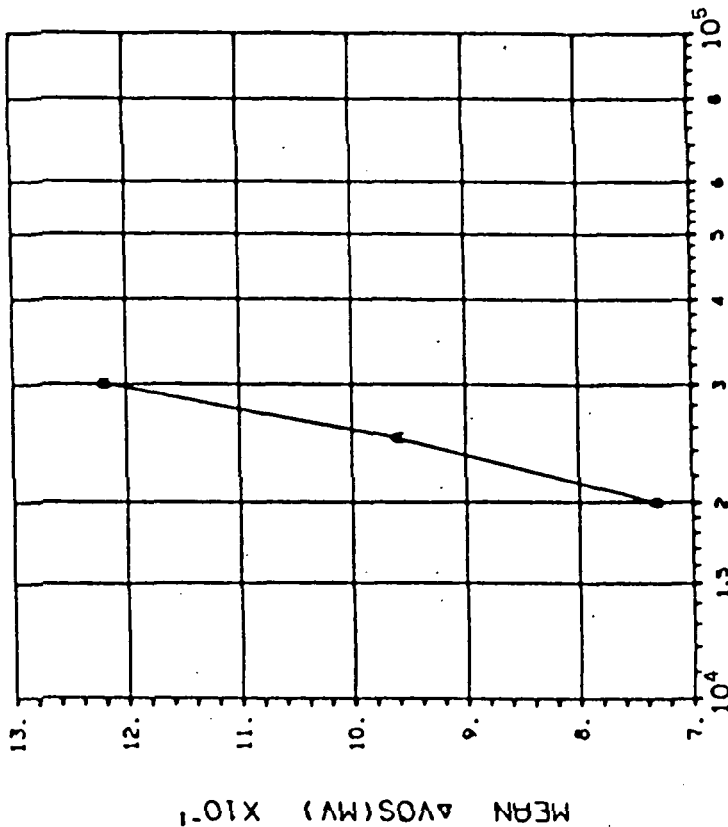
MFG: HAR

4 DEVICES

TEST DATE 10-21-81

REF: JPL LOG 0794-2

DATE CODE NONE



DOSE, rad(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 20 | 25 | 30 |
| A | .3076 | .4068 | .5324 |
| | 40 | 50 | |
| | NA | NA | NA |

DEVICE TYPE: HA2700 OP AMP
MFG: HAR 4 DEVICES TEST DATE 10-21-81
REF: JPL LOG 0794-1 DATE CODE NONE

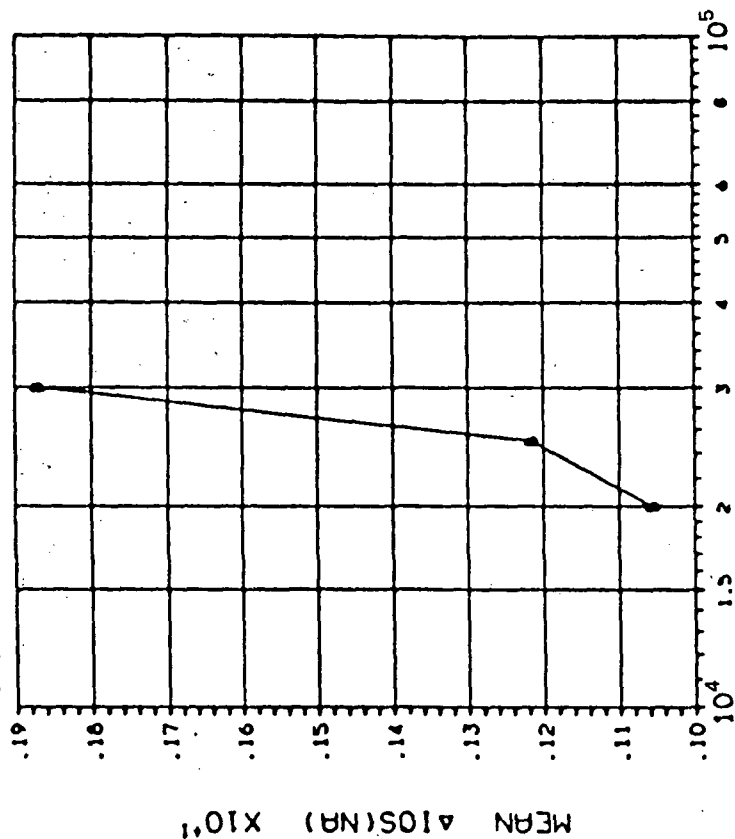


DOSE, rads(Si) 2.5 MeV electrons

(2) Δ IOS(NR): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------------|-----------|
| CURVE | DOSE, kilorads(Si) | |
| | 1 | 3 6 10 15 |
| B | .0916 .1931 .3960 .4913 .6137 | |

DEVICE TYPE: HA2700 OP AMP
MFG: HAR 4 DEVICES TEST DATE 10-21-81
REF: JPL LOG 0794-2 DATE CODE NONE



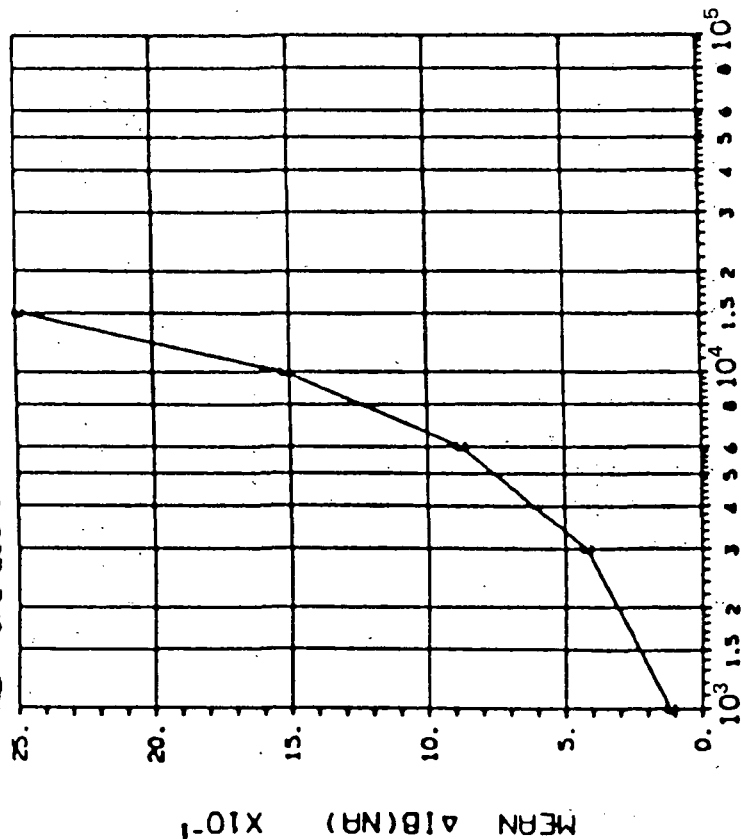
DOSE, rads(Si) 2.5 MeV electrons

(2) Δ IOS(NR): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 20 | 25 30 40 50 |
| B | .7143 1.003 .8608 .8888 .8888 | |

DEVICE TYPE: HR2700 OP AMP
 MFG: HAR 4 DEVICES
 REF: JPL LOG 0794-1

TEST DATE 10-21-81
 DATE CODE NONE

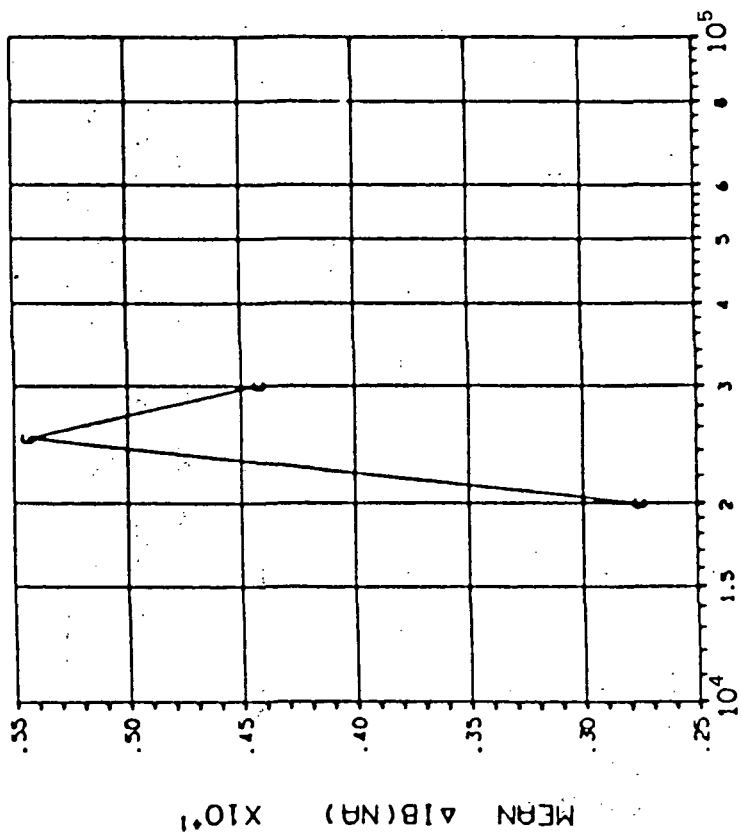


DOSE, rads(Si) 2.5 MeV electrons
 (3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 1 |
| | 3 |
| | 6 |
| | 10 |
| | 15 |
| | .1679 .6626 1.679 3.536 5.706 |

DEVICE TYPE: HR2700 OP AMP
 MFG: HAR 4 DEVICES
 REF: JPL LOG 0794-2

TEST DATE 10-21-81
 DATE CODE NONE



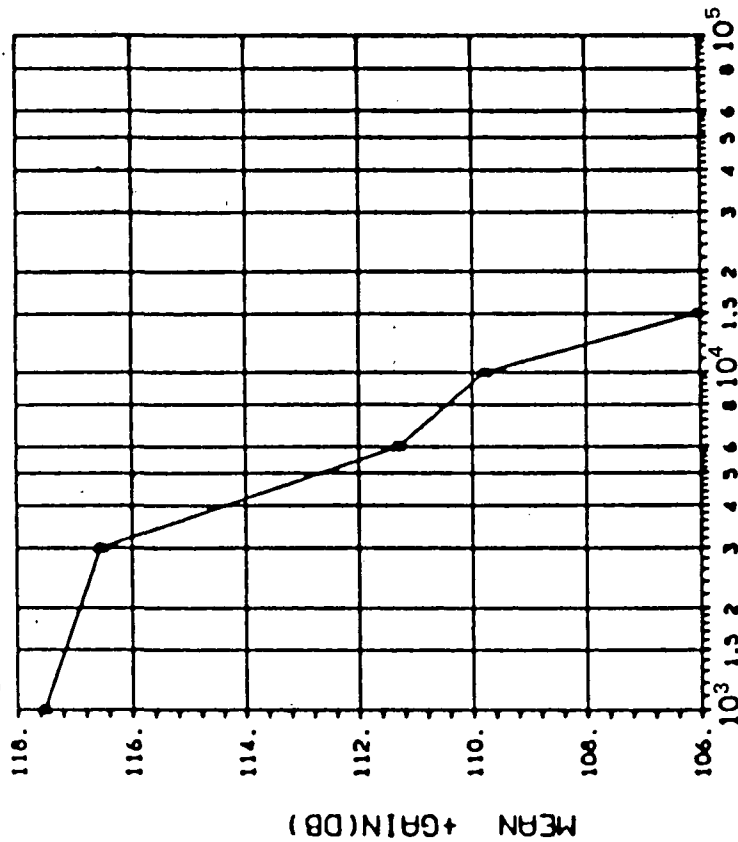
DOSE, rads(Si) 2.5 MeV electrons
 (3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 20 |
| | 25 |
| | 30 |
| | 40 |
| | 50 |
| | 6.693 7.491 13.98 ***** |

DEVICE TYPE: H82700 OP AMP

MFG: HAR 4 DEVICES TEST DATE 10-21-81

REF: JPL LOG 0794-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(4)*GAIN(0.75MA LOAD +3V): VS DOSE

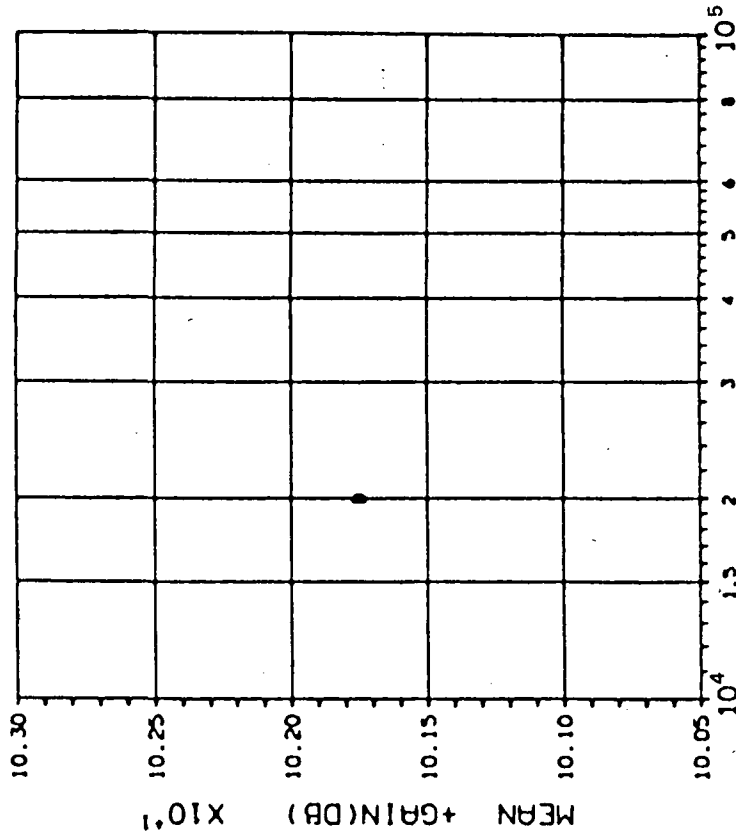
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | .750 | 1.811 1.321 .4762 .6373 .6742 |

INITIAL MEAN VALUE +GAIN(DB) = 1.19X10⁻⁴

DEVICE TYPE: H82700 OP AMP

MFG: HAR 4 DEVICES TEST DATE 10-21-81

REF: JPL LOG 0794-2 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(4)*GAIN(0.75MA LOAD +3V): VS DOSE

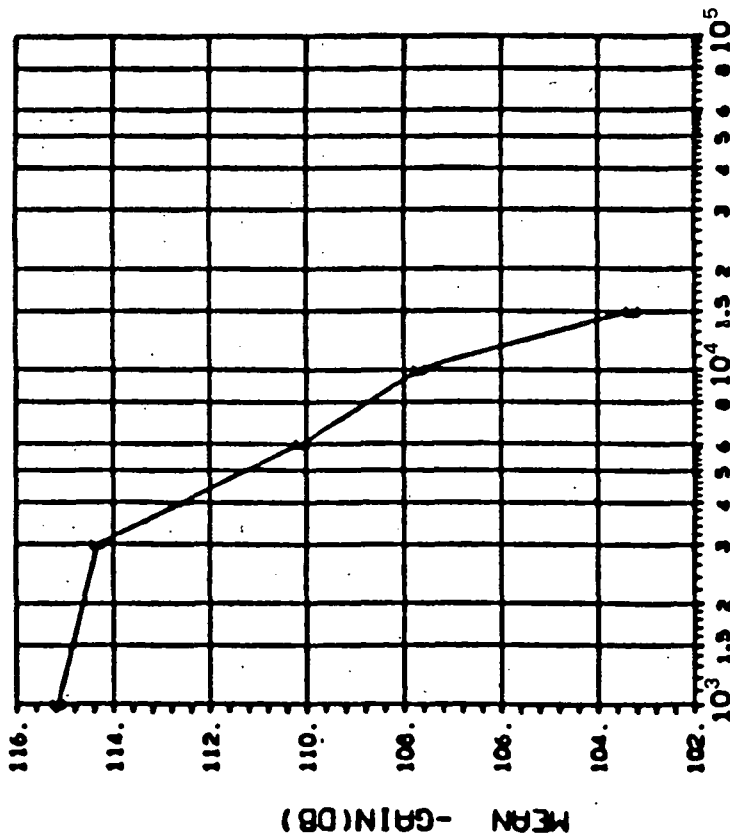
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | .750 | 20 25 30 40 50 |

INITIAL MEAN VALUE +GAIN(DB) = 1.19X10⁻²

DEVICE TYPE: HR2700 OP AMP

MFG: HAR 4 DEVICES TEST DATE 10-21-81

REF: JPL LOG 0794-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(0.75MA LOAD -3V): VS DOSE

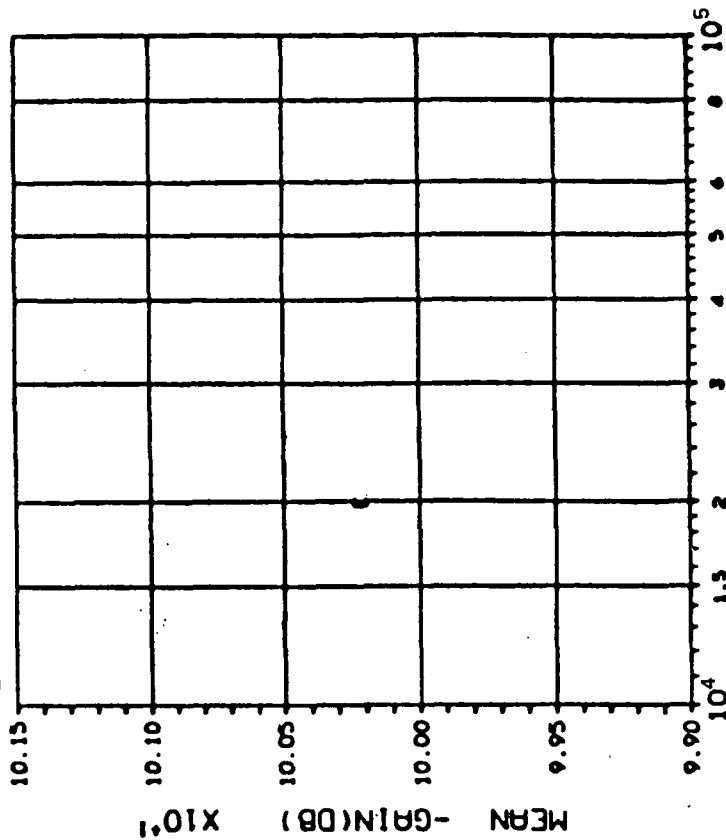
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | .750 | .6424 .6733 1.133 1.154 1.158 |

INITIAL MEAN VALUE -GAIN(DB) = 1.16x10⁻³

DEVICE TYPE: HR2700 OP AMP

MFG: HAR 4 DEVICES TEST DATE 10-21-81

REF: JPL LOG 0794-2 DATE CODE NONE



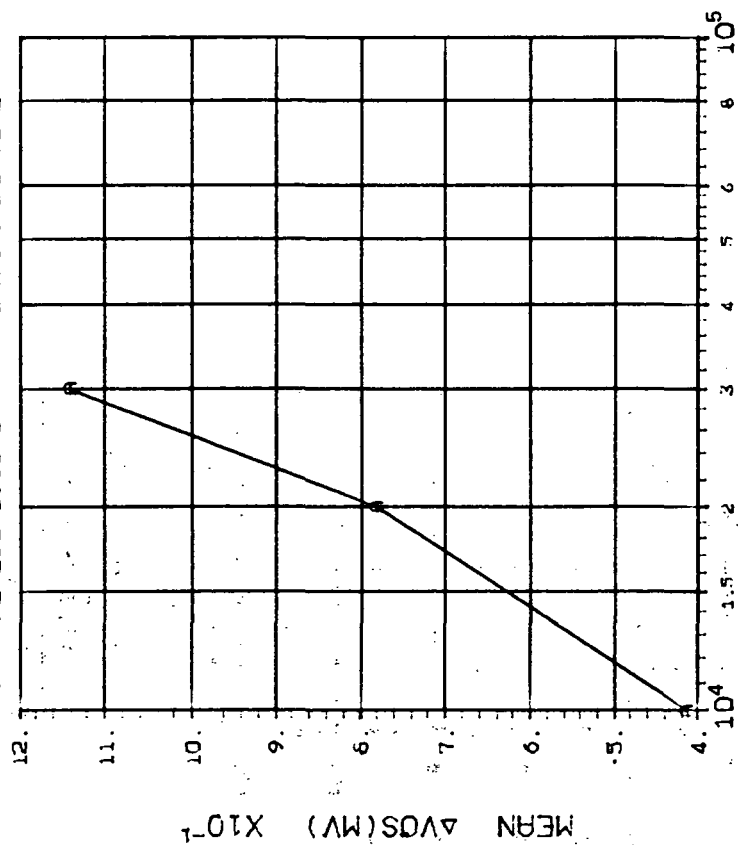
DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(0.75MA LOAD -3V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | .750 | 4.481 4.481 4.481 4.481 4.481 |

INITIAL MEAN VALUE -GAIN(DB) = 1.16x10⁻²

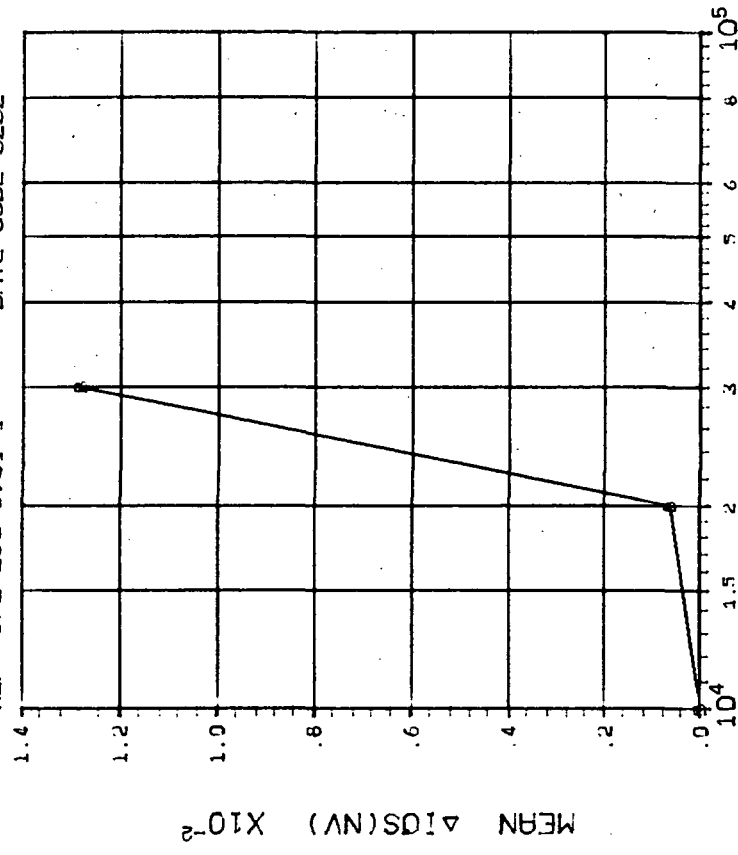
DEVICE TYPE: H45064(JFET, QUAD OP AMP)
 MFG: HRR 8 DEVICES TEST DATE 7-19-83
 REF: JPL LOG 096J-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons
 (1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| A | .3087 | .5887 | .8640 | ***** |

DEVICE TYPE: H45064(JFET, QUAD OP AMP)
 MFG: HRR 8 DEVICES TEST DATE 7-19-83
 REF: JPL LOG 096J-1 DATE CODE 8232



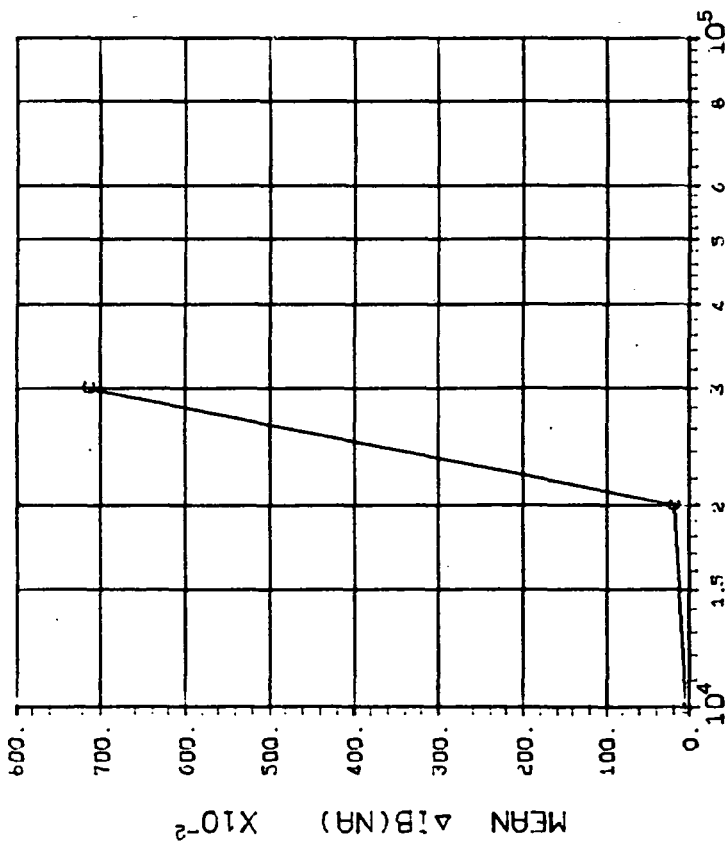
DOSE, rads(Si) 2.5 MeV electrons
 (2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| B | .0130 | .1186 | 6.620 | ***** |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)

MFG: HBR 8 DEVICES TEST DATE 7-19-83

REF: JPL LOG 0961-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

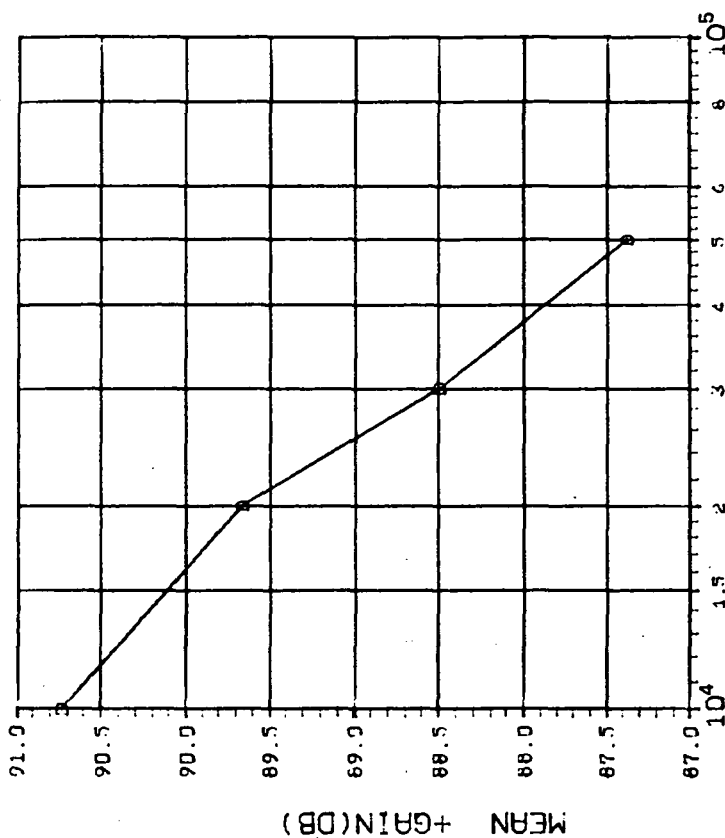
(3) $\Delta IB(NA)$: VSDOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .5467 | .6408 2.690 ***** |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)

MFG: HBR 8 DEVICES TEST DATE 7-19-83

REF: JPL LOG 0961-1 DATE CODE 8232



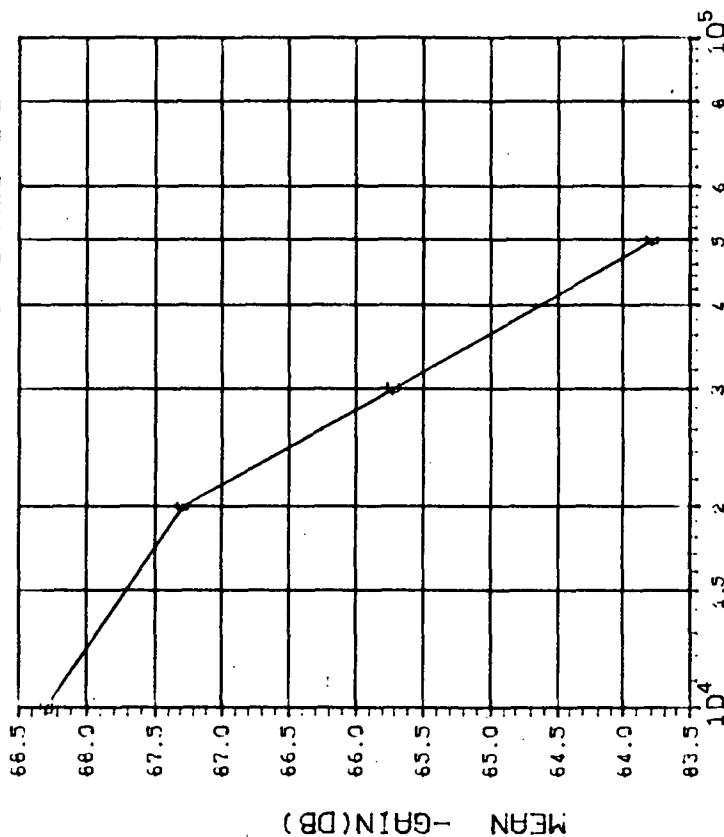
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | 1.00 | 6.105 6.396 6.507 6.416 |

INITIAL MEAN VALUE +GAIN(DB) = 9.24X10¹¹

DEVICE TYPE: HA5064 (JFET, QUAD OP AMP)
 MFG: HAR 8 DEVICES TEST DATE 7-19-83
 REF: JPL LOG 0961-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

(51)-GAIN(DB) VS DOSE

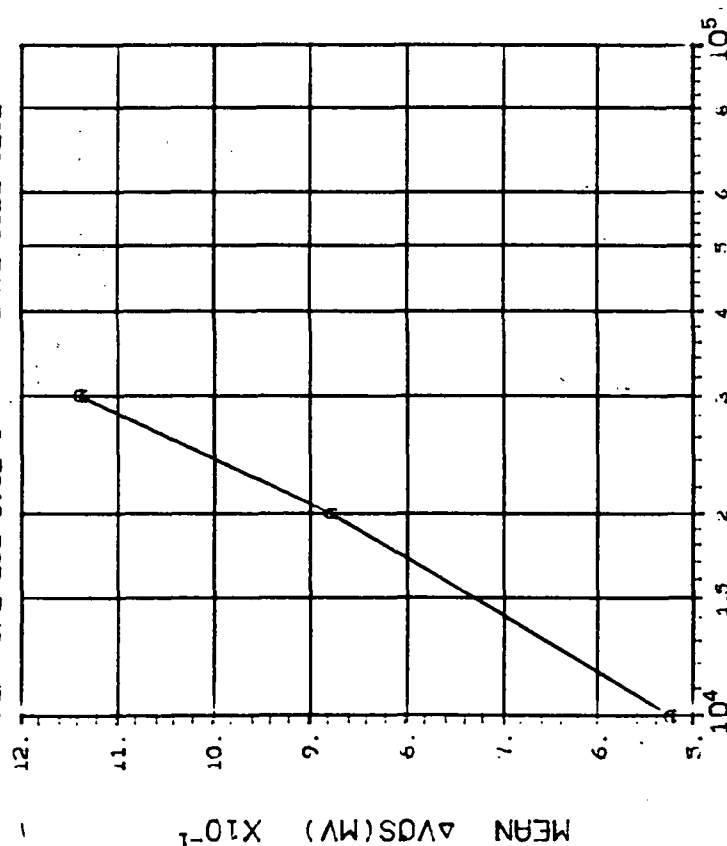
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|---------------|--------------------|-------|-------|
| CURVE | 1_L (mA) | DOSE, kilorads(Si) | | |
| | | 10 | 20 | 30 |
| E | 1.00 | 3.699 | 3.609 | 3.413 |
| | | | | 3.398 |

INITIAL MEAN VALUE -GAIN(DB) = 9.00×10^{-1}

DEVICE TYPE: H45064 (JFET, QUAD OP AMP)

MFG: HRR 8 DEVICES TEST DATE 7-21-83

REF: JPL LOG 0962-1 DATE CODE 8232



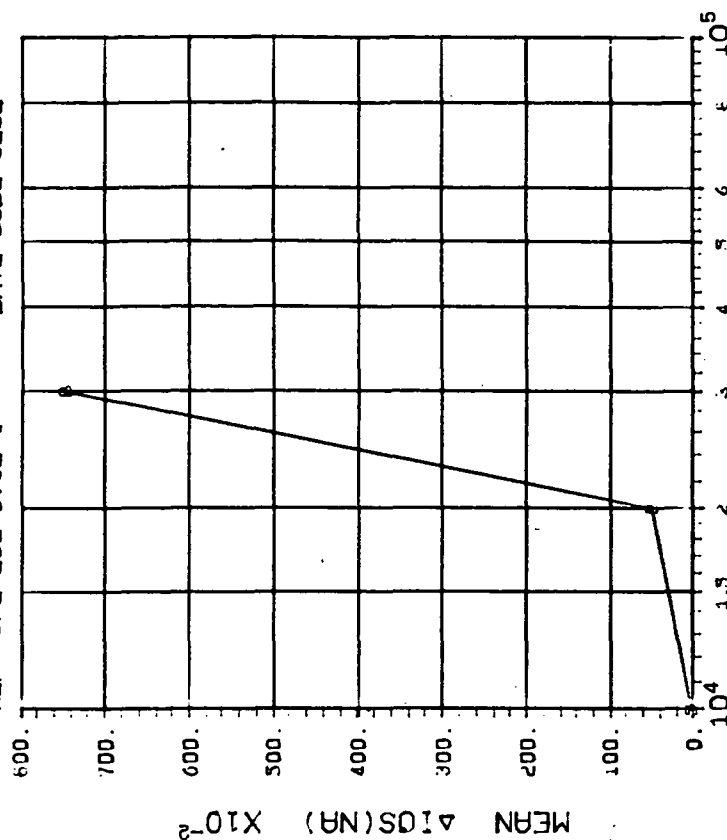
(1) $\Delta VDS(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------|-------------------|
| CURVE | DOSE, kilogy(Si) | |
| | 10 | 20 30 50 |
| 9 | .2270 | .3445 .5512 ***** |

DEVICE TYPE: H45064 (JFET, QUAD OP AMP)

MFG: HRR 8 DEVICES TEST DATE 7-21-83

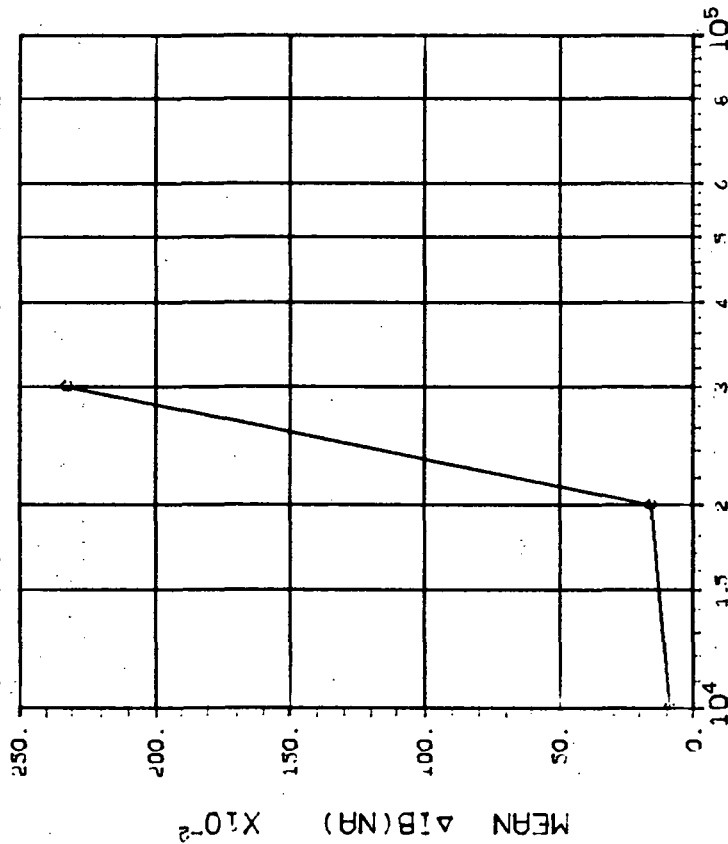
REF: JPL LOG 0962-1 DATE CODE 8232



(2) $\Delta IOS(MA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------|-------------------|
| CURVE | DOSE, kilogy(Si) | |
| | 10 | 20 30 50 |
| 9 | .0396 | .1220 3.676 ***** |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)
MFG: HPR 8 DEVICES TEST DATE 7-21-83
REF: JPL LOG 0962-1 DATE CODE 8232

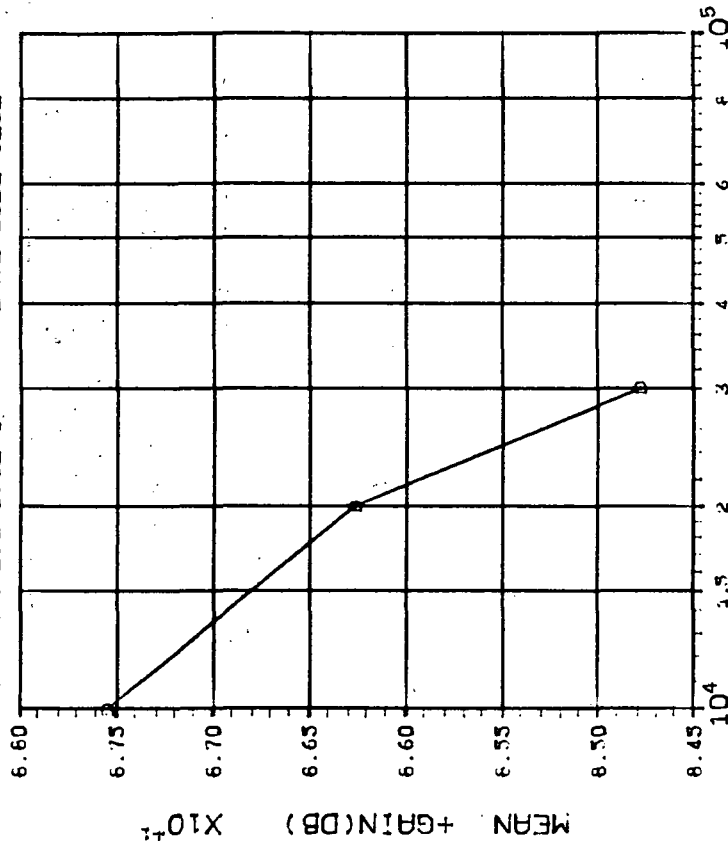


DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 10 | .6095 |
| | 20 | .7527 |
| | 30 | 3.038 |
| | 50 | ***** |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)
MFG: HPR 8 DEVICES TEST DATE 7-21-83
REF: JPL LOG 0962-1 DATE CODE 8232



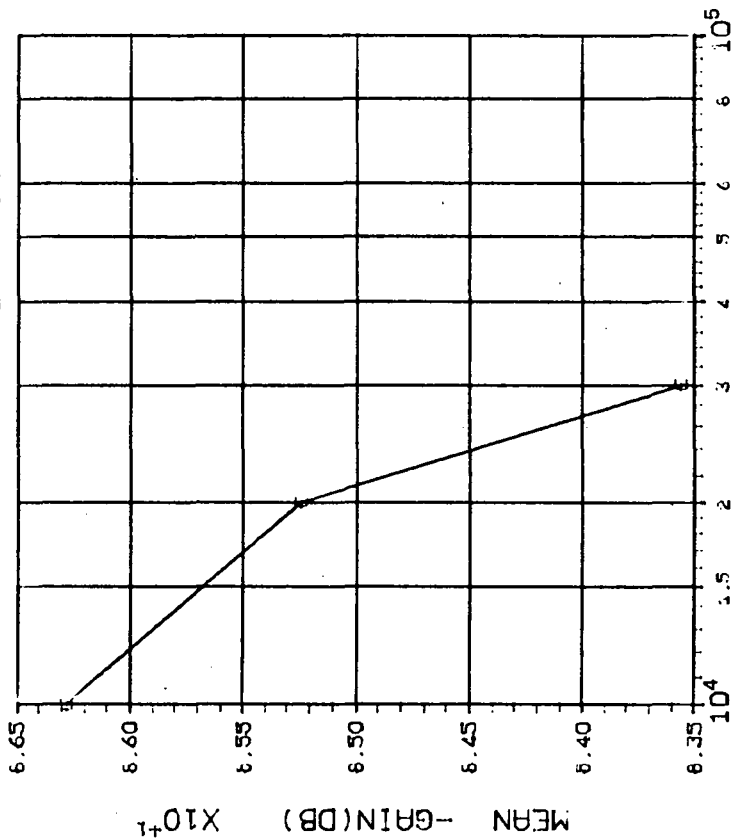
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| J | 1.00 | 3.106 |
| | 2.0 | 2.998 |
| | 3.0 | 3.298 |
| | 50 | ***** |

INITIAL MEAN VALUE +GAIN(DB) = 8.95X10⁺¹

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)
 MFG: HAR 8 DEVICES TEST DATE 7-21-83
 REF: JPL LOG 0962-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

(3)-GAIN(DB) VS DOSE

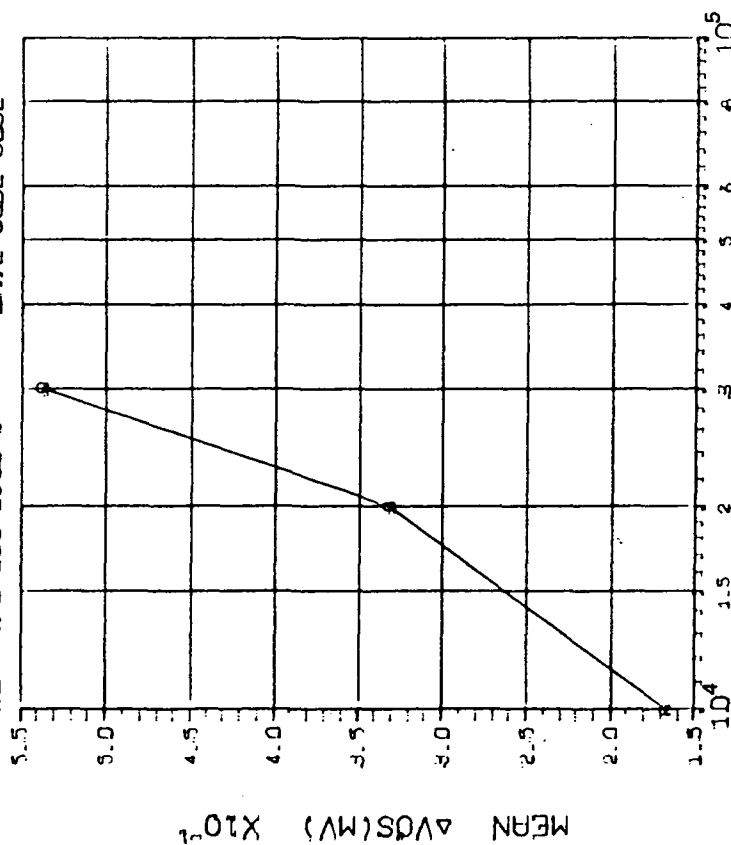
| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|--------------------|------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| | | 10 | 20 30 50 |
| C | 1.00 | 1.974 | 2.355 2.195 **** |

INITIAL MEAN VALUE -GAIN(DB) = 8.62X10⁻¹

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)

MFG: HPR 6 DEVICES TEST DATE 7-20-83

REF: JPL LOG D963-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

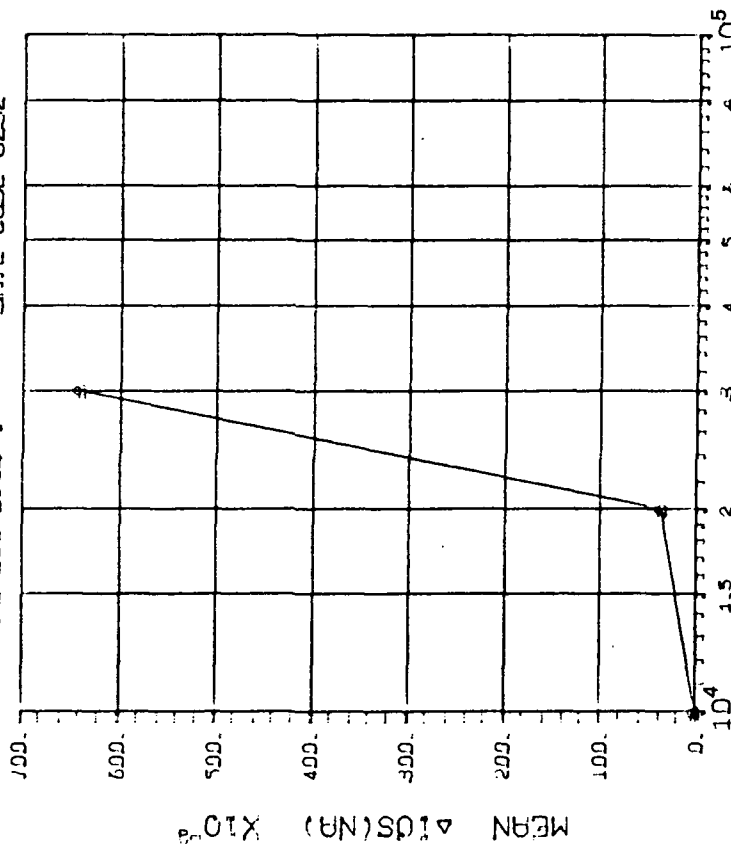
(1)ΔVDS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| 1 | .0621 | .1436 .2052 ##### |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)

MFG: HPR 6 DEVICES TEST DATE 7-20-83

REF: JPL LOG D963-1 DATE CODE 8232

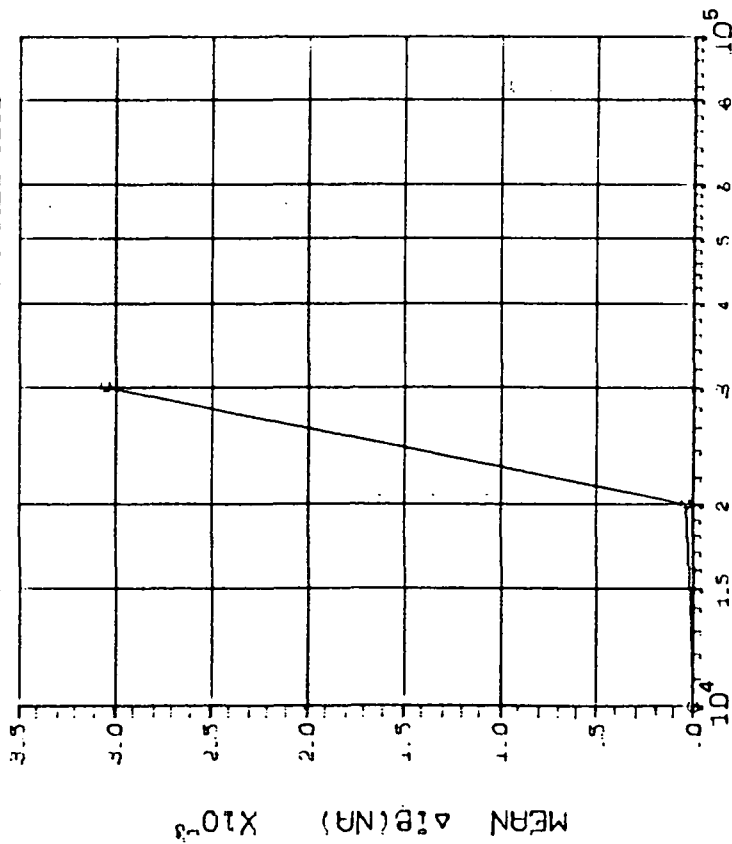


DOSE, rads(Si) 2.5 MeV electrons

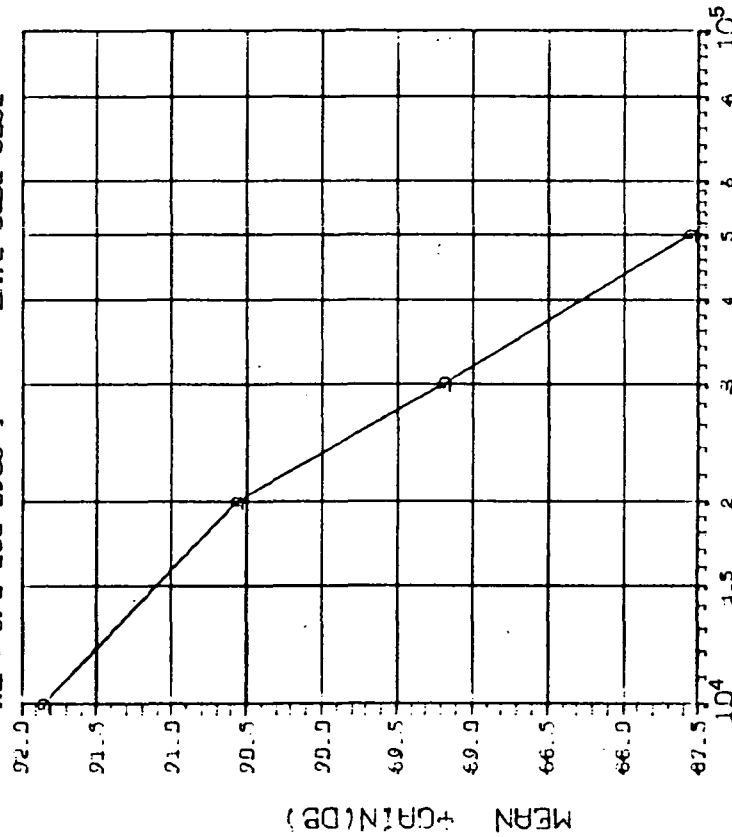
(2)ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| 2 | .0249 | .2513 5.652 ##### |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)
 MFG: HBR 6 DEVICES TEST DATE 7-20-63
 REF: JPL LOG 0963-1 DATE CODE 6232



DEVICE TYPE: HA5064(JFET, QUAD OP AMP)
 MFG: HBR 6 DEVICES TEST DATE 7-20-63
 REF: JPL LOG 0963-1 DATE CODE 6232

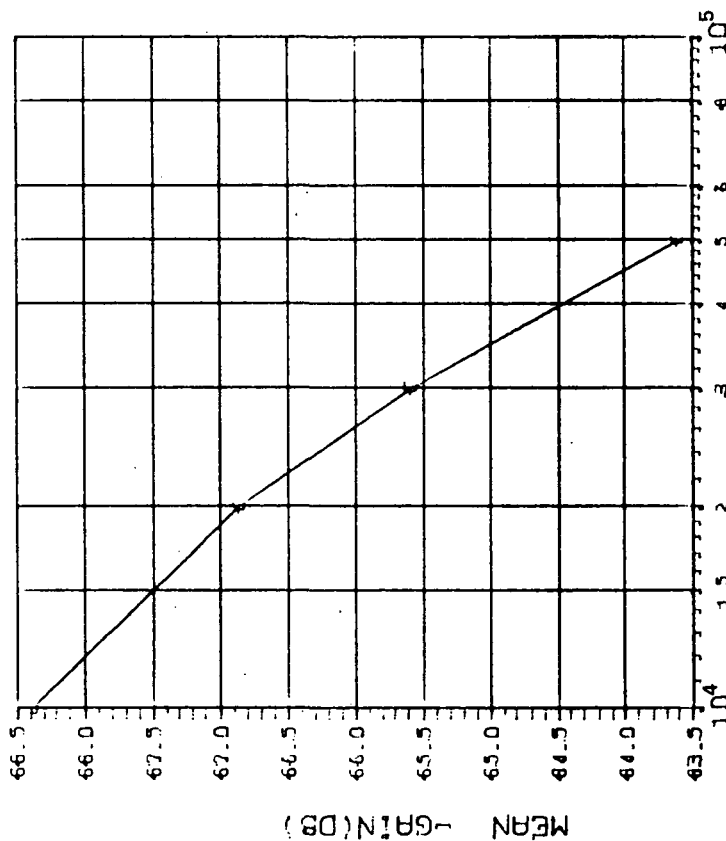


INITIAL MEAN VALUE $+GAIN(DB) = 9.24 \times 10^{-3}$

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)

MFG: HRR 8 DEVICES TEST DATE 7-20-83

REF: JPL LOG 0963-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

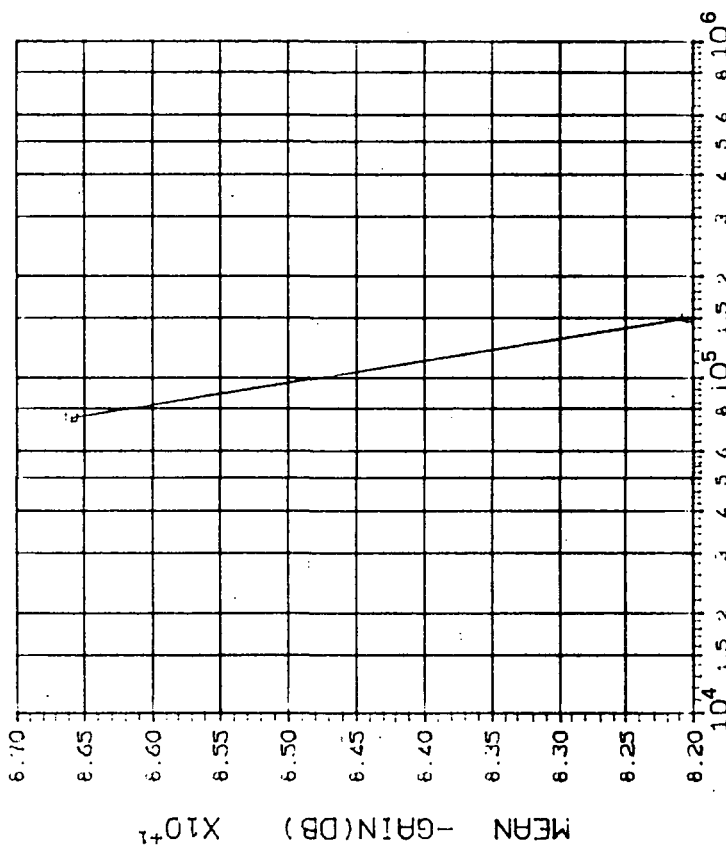
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 2.696 2.161 1.943 1.750 |

INITIAL MEAN VALUE -GAIN(DB) = 6.92X10⁺¹

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)

MFG: HRR 8 DEVICES TEST DATE 7-20-83

REF: JPL LOG 0963-2 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

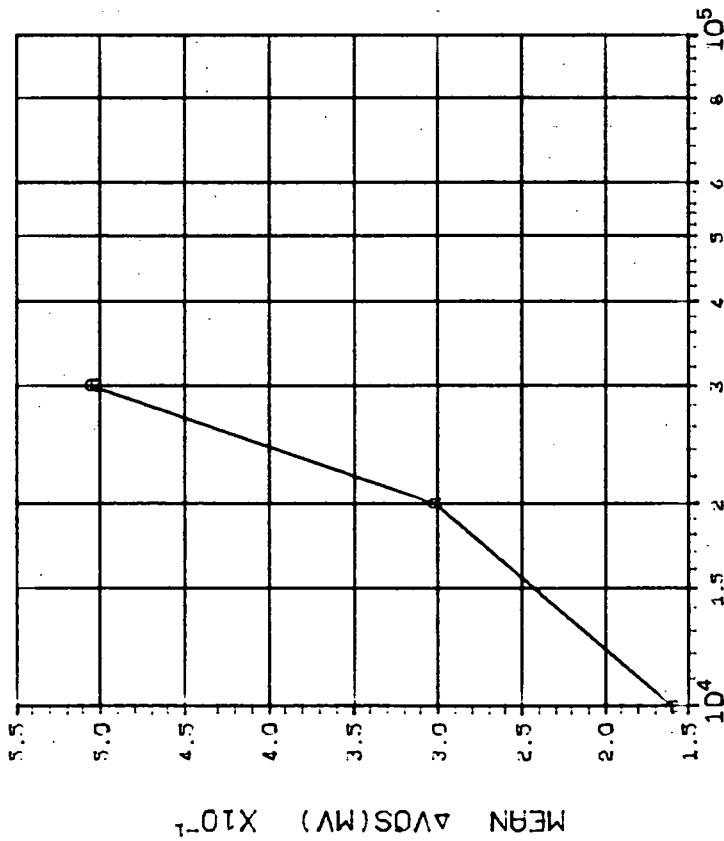
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 |
| | | 5.435 1.668 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 8.92X10⁺¹

DEVICE TYPE: H45064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-22-83

REF: JPL LOG 0964-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

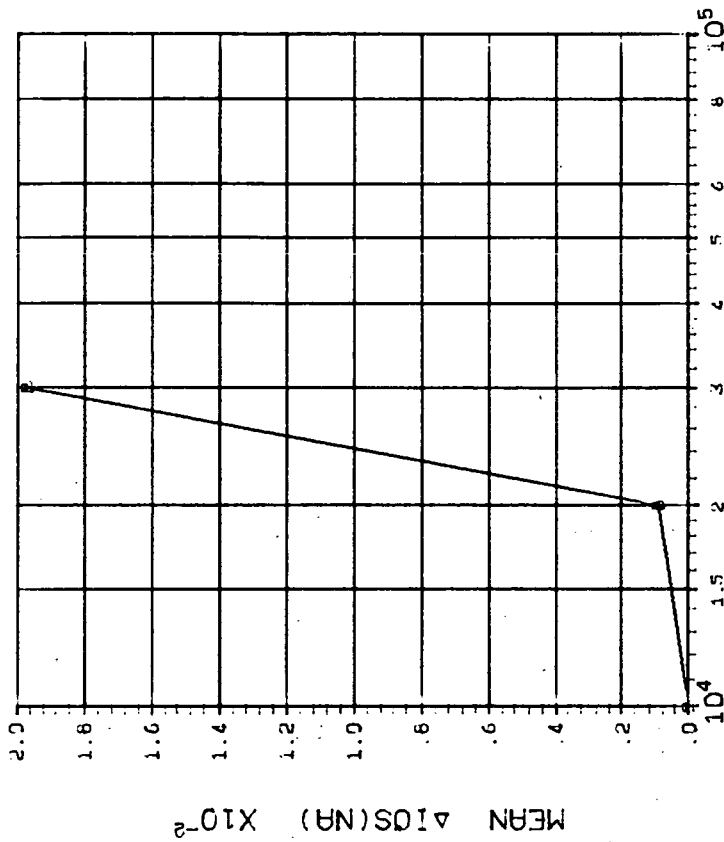
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 50 |
| A | .1080 | .1625 | .2543 ***** |

DEVICE TYPE: H45064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-22-83

REF: JPL LOG 0964-1 DATE CODE 8232

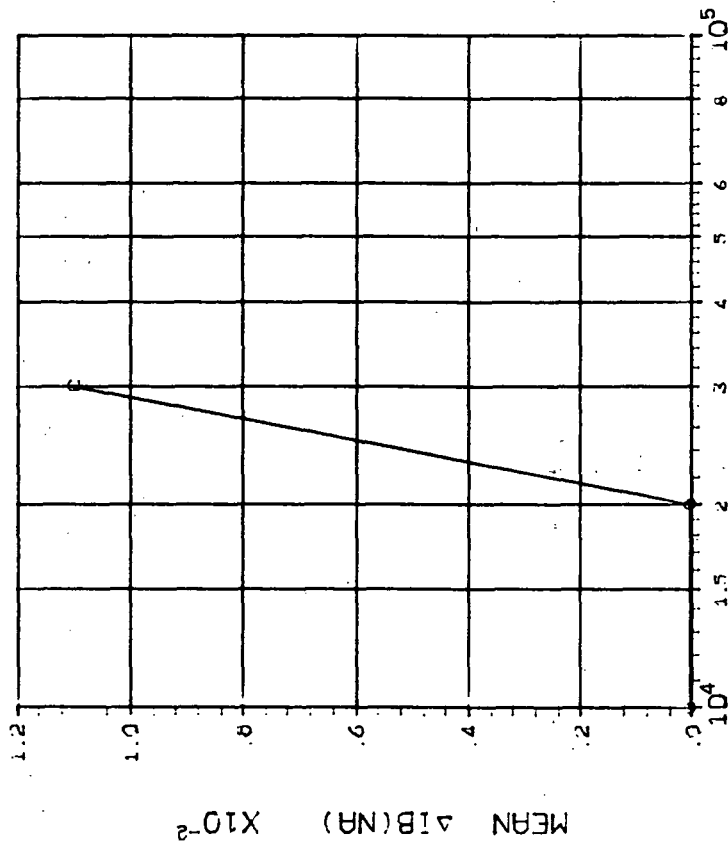


DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 50 |
| B | .0200 | .2353 | 9.953 ***** |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)
 MFG: HPR 8 DEVICES TEST DATE 7-22-83
 REF: JPL LOG 0964-1 DATE CODE 8232

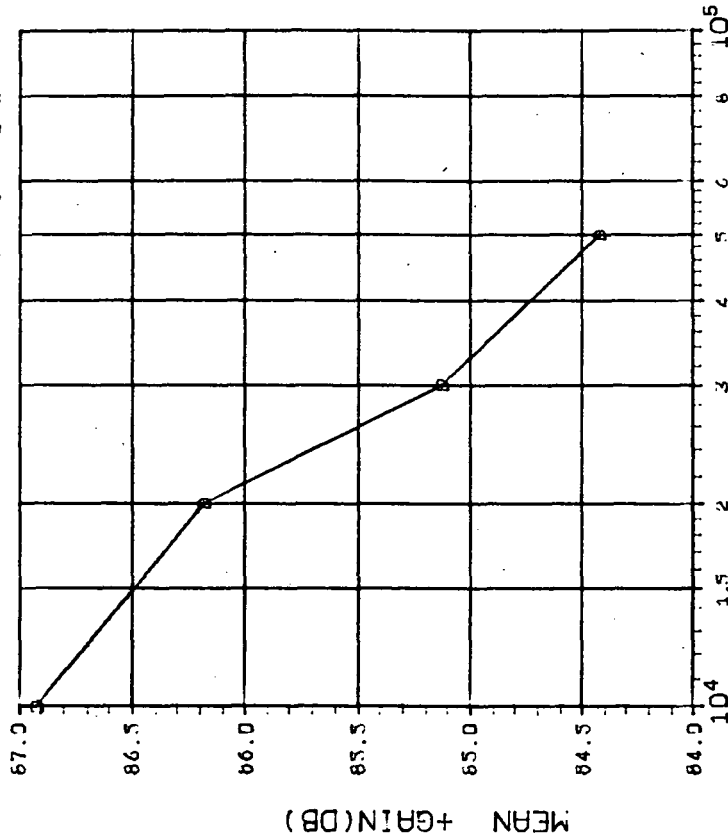


DOSE, rads(Si) 2.5 MeV electrons

(3) $\Delta I_B(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .1876 | .3055 6.201 ***** |

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)
 MFG: HPR 8 DEVICES TEST DATE 7-22-83
 REF: JPL LOG 0964-1 DATE CODE 8232



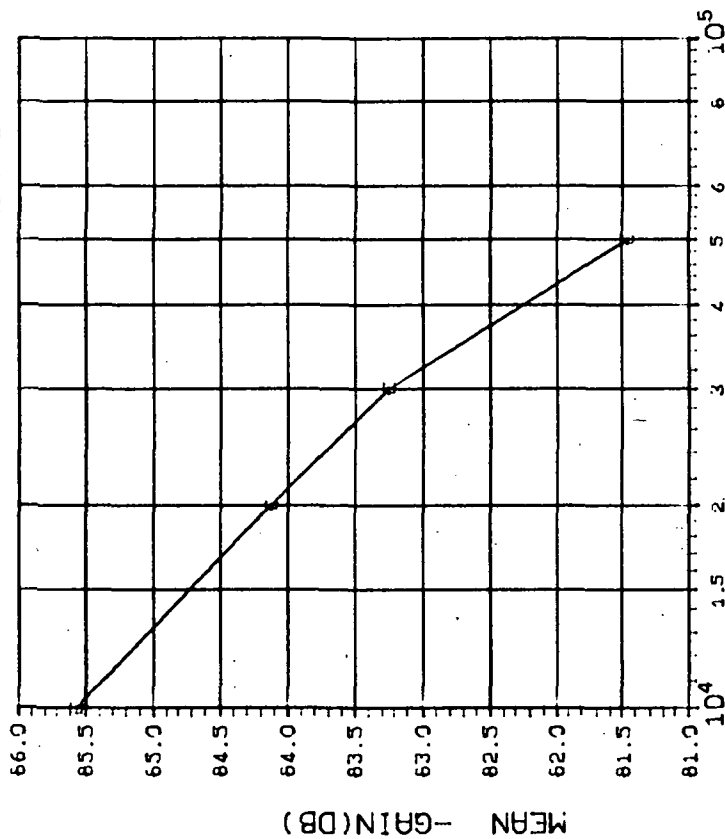
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------|-------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| | 10 | 20 30 50 |
| D | 1.00 | 1.054 1.366 1.654 1.500 |

INITIAL MEAN VALUE +GAIN(DB) = $8.68 \times 10^{+1}$

DEVICE TYPE: HA5064(JFET, QUAD OP AMP)
 MFG: HRR 8 DEVICES TEST DATE 7-22-83
 REF: JPL LOG 0964-1 DATE CODE 8232



DOSE, rads(Si) 2.5 MeV electrons

(S)-GAIN(DB) VS DOSE

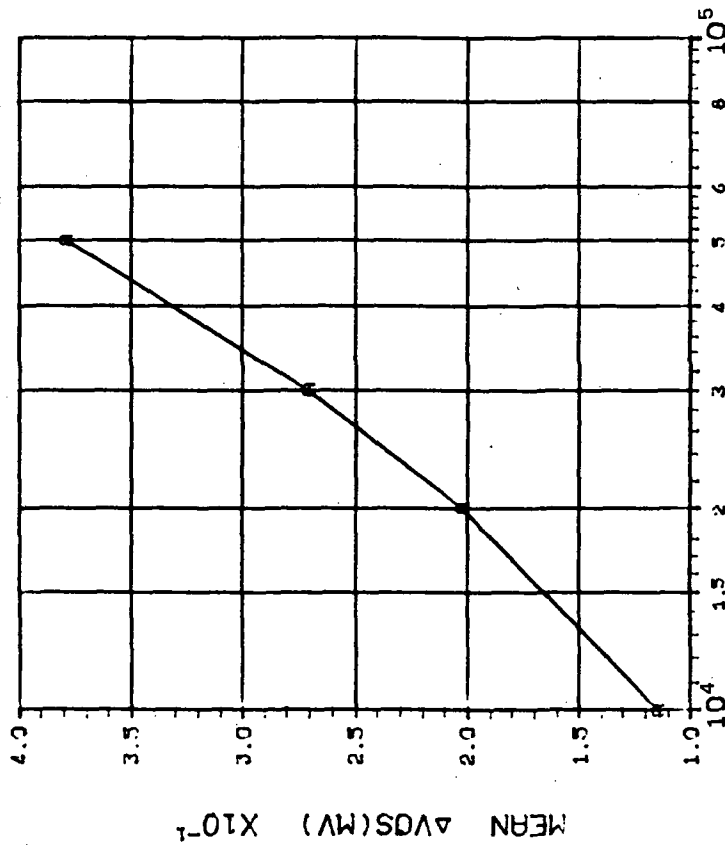
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| E | 1.00 | 2.286 | 1.471 | 1.922 |
| | | 1.127 | | |

INITIAL MEAN VALUE -GAIN(DB) = 8.69×10^{-1}

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-25-83

REF: JPL LOG 0965-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas

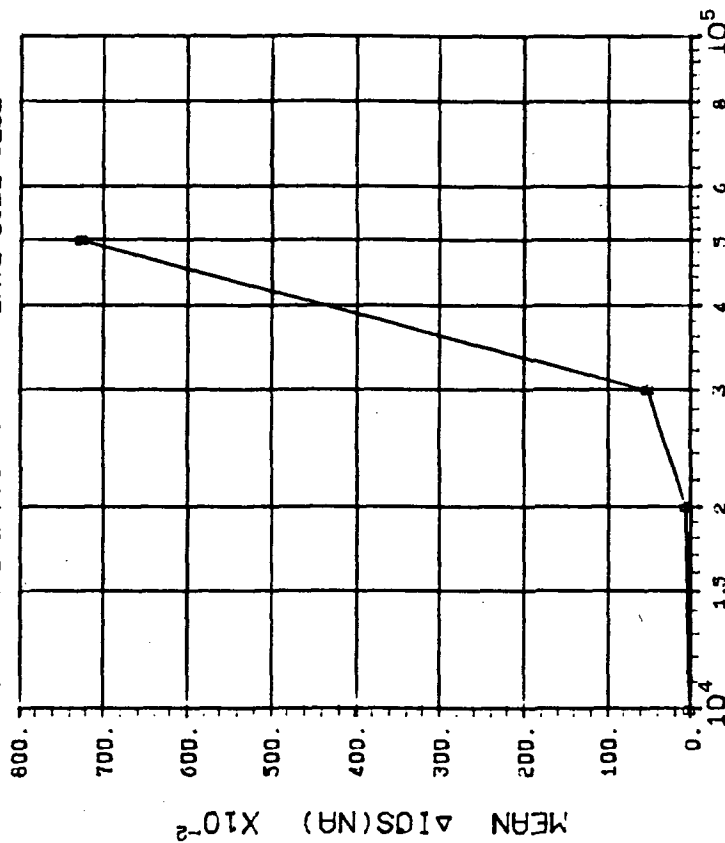
(1)ΔVGS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| A | .0469 | .0953 | .1114 | .1631 |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-25-83

REF: JPL LOG 0965-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas

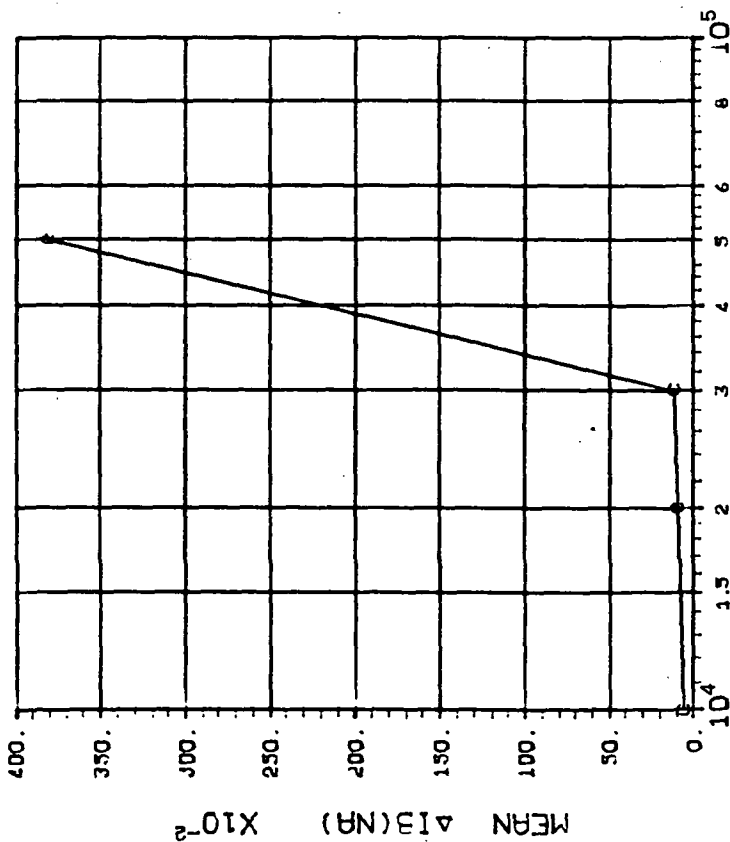
(2)ΔIOS(NR): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| B | .0267 | .0417 | .0840 | 2.008 |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-25-83

REF: JPL LOG 0965-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas

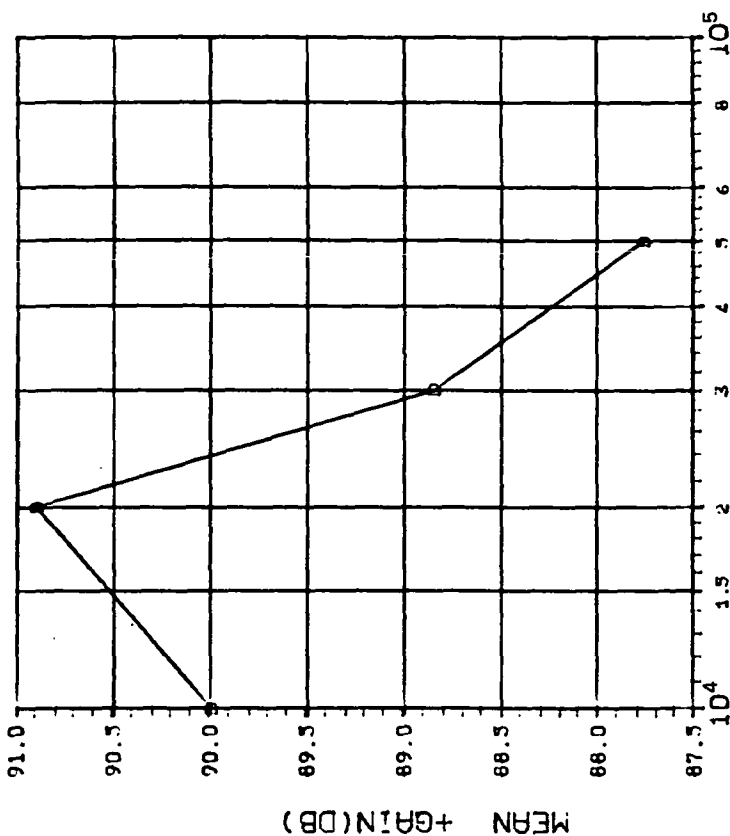
(3) $\Delta I_B(NA)$ VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .1131 | .1805 .2142 1.409 |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-25-83

REF: JPL LOG 0965-1 DATE CODE 8232



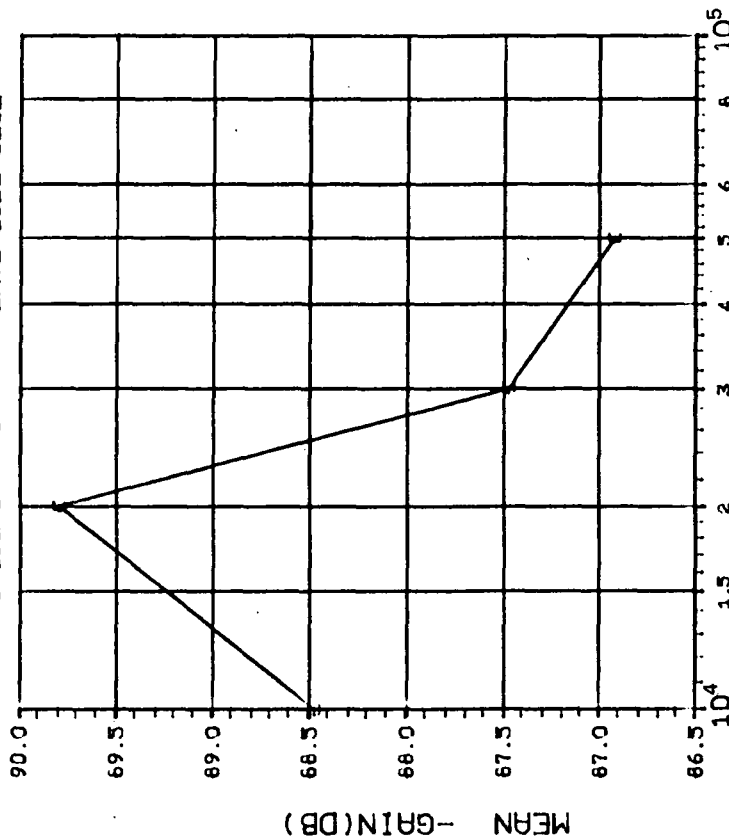
DOSE, rads(Si) Co 60 Gammas

(4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|--------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| | 1.00 | 10 20 30 50 |
| D | 3.065 | 4.324 2.401 2.873 |

INITIAL MEAN VALUE +GAIN(DB) = $9.00 \times 10^{+1}$

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)
 MFG: HPR 8 DEVICES TEST DATE 7-25-83
 REF: JPL LOG 0965-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas
 (5)-GAIN(DB) VS DOSE

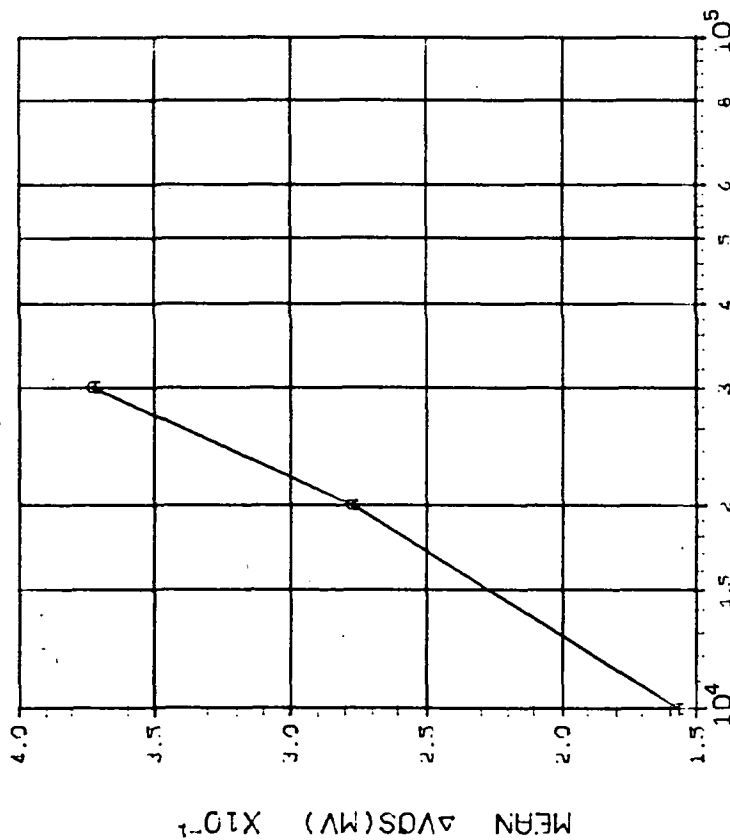
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|---------------|--------------------|-------|--------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) | | |
| E | 1.00 | 10 | 20 | 30 |
| | | 50 | | |
| | | 2.637 | 4.487 | 11.571 |
| | | 2.405 | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

INITIAL MEAN VALUE -GAIN(DB) = $9.00 \times 10^{+1}$

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-26-83

REF: TPL LOG 0966-1 DATE CODE 8232

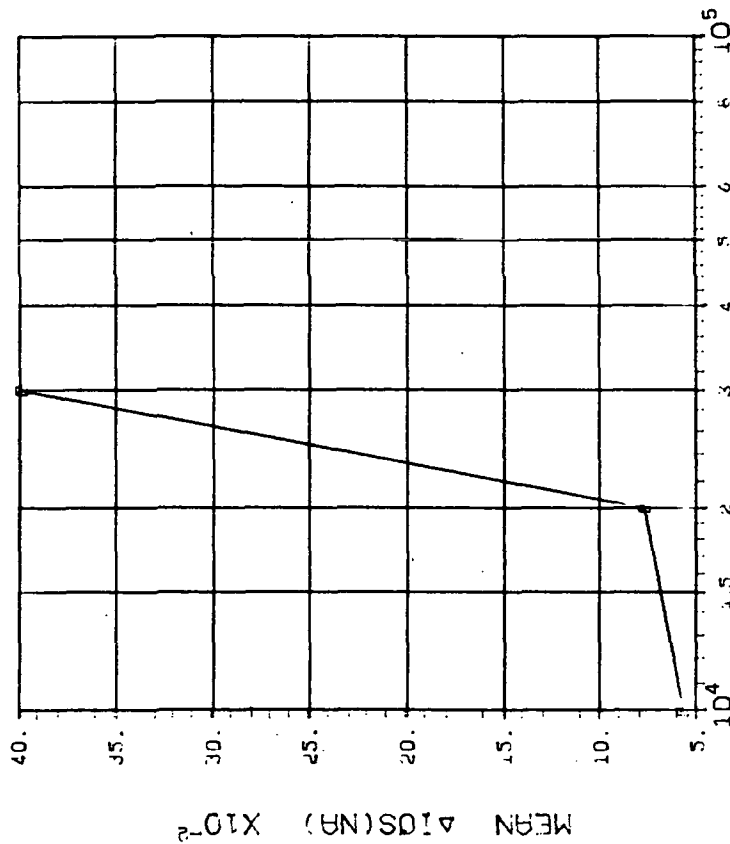


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 |
| | 20 |
| | 30 |
| .0817 .1074 .1411 ***** | |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-26-83

REF: JPL LOG 0966-1 DATE CODE 8232

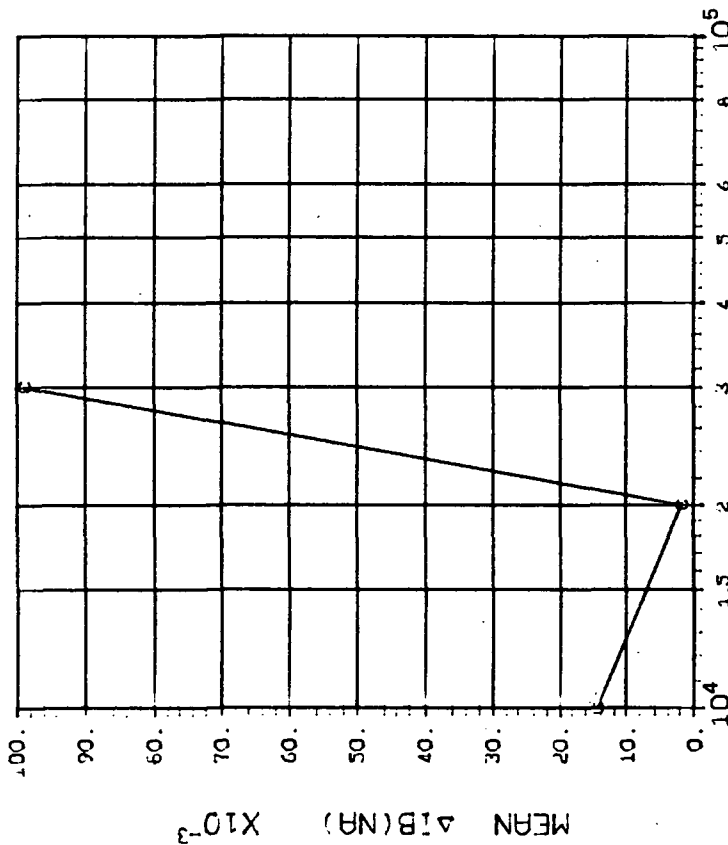


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| .0632 .0650 .2610 ***** | |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-26-83

REF: JPL LOG 0966-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas

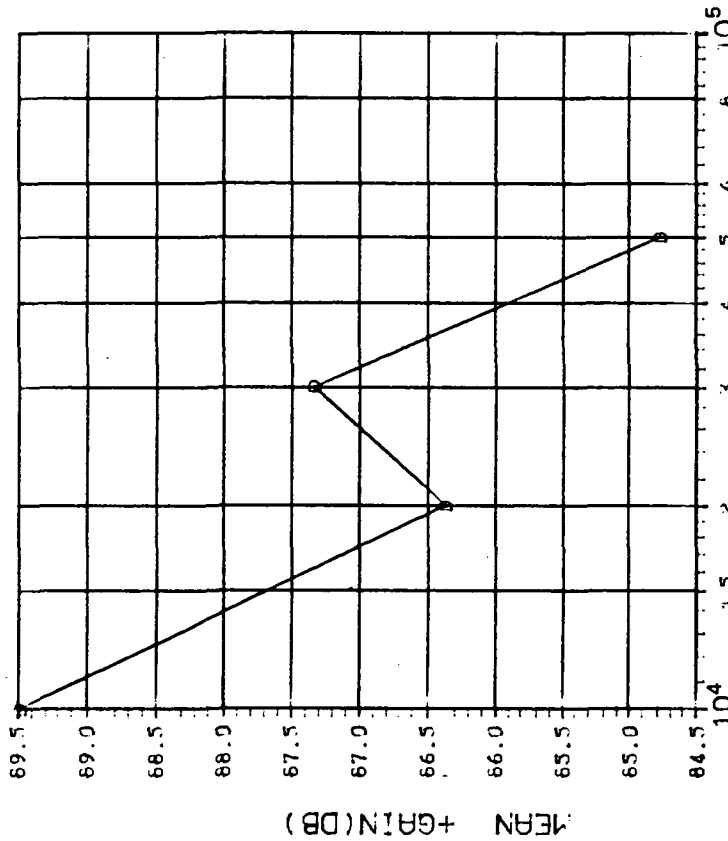
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .1916 | .2938 .3130 ***** |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-26-83

REF: JPL LOG 0966-1 DATE CODE 8232



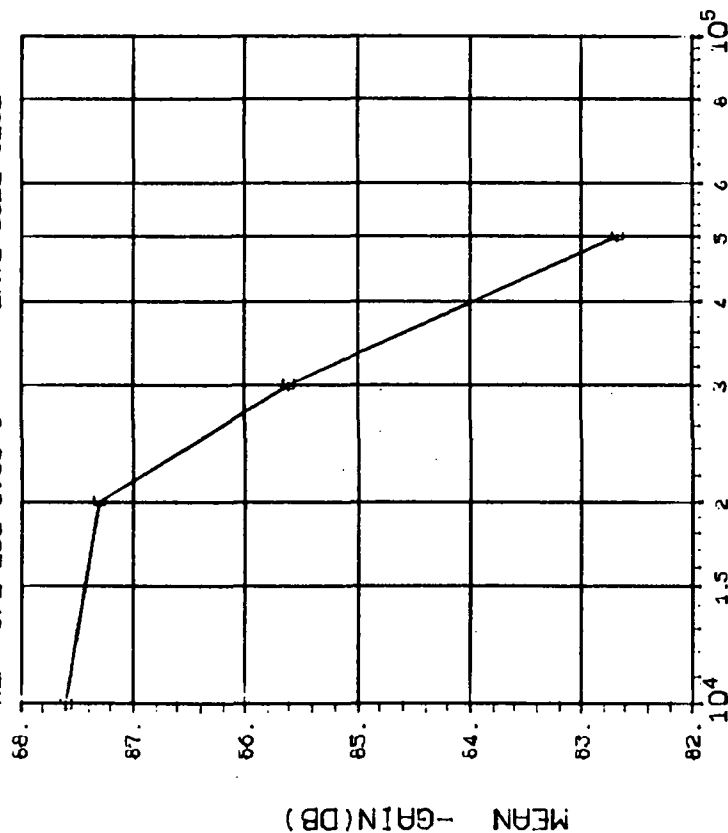
DOSE, rads(Si) Co 60 Gammas

(4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------|-------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| | 10 | 20 30 50 |
| D | 1.00 | 4.550 4.552 4.581 4.011 |

INITIAL MEAN VALUE +GAIN(DB) = $8.92 \times 10^{+1}$

DEVICE TYPE: HA5084(JFET,QUAD OP AMP)
 MFG: HRR 8 DEVICES TEST DATE 7-26-83
 REF: JPL LOG 0966-1 DATE CODE 8232



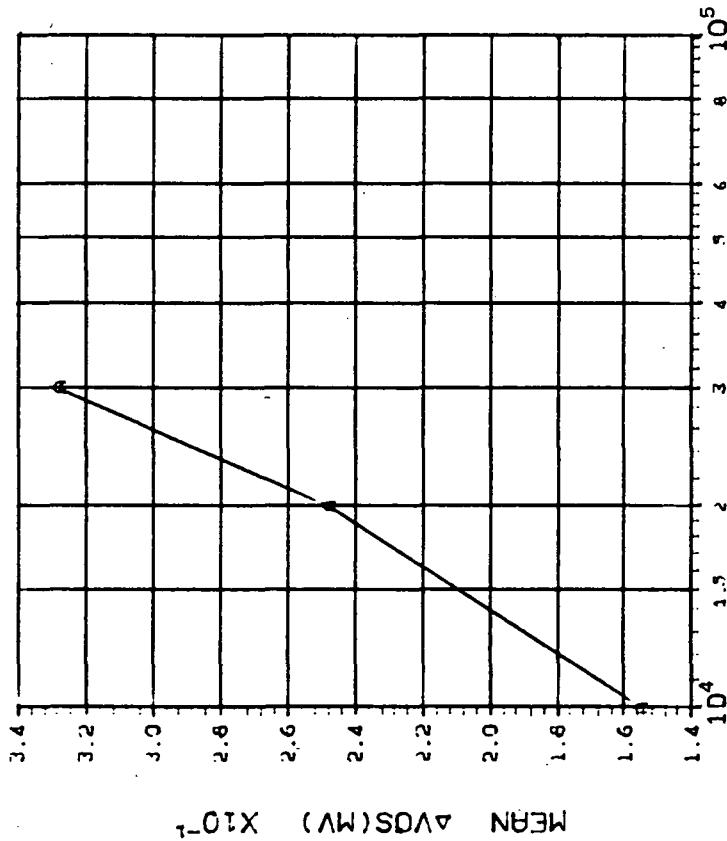
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 5.622 5.013 4.705 4.508 |

INITIAL MEAN VALUE -GAIN(DB) = $8.63 \times 10^{+1}$

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HFR 8 DEVICES TEST DATE 7-27-83

REF: JPL LOG 0967-1 DATE CODE 8232



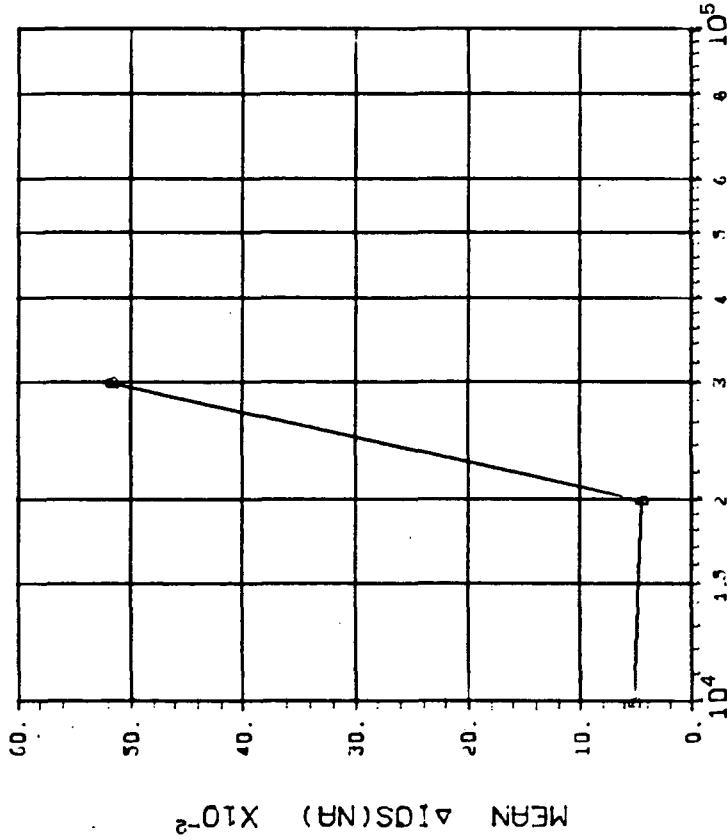
(1) $\Delta VOS(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0713 | .1234 .1430 ***** |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HFR 8 DEVICES TEST DATE 7-27-83

REF: JPL LOG 0967-1 DATE CODE 8232



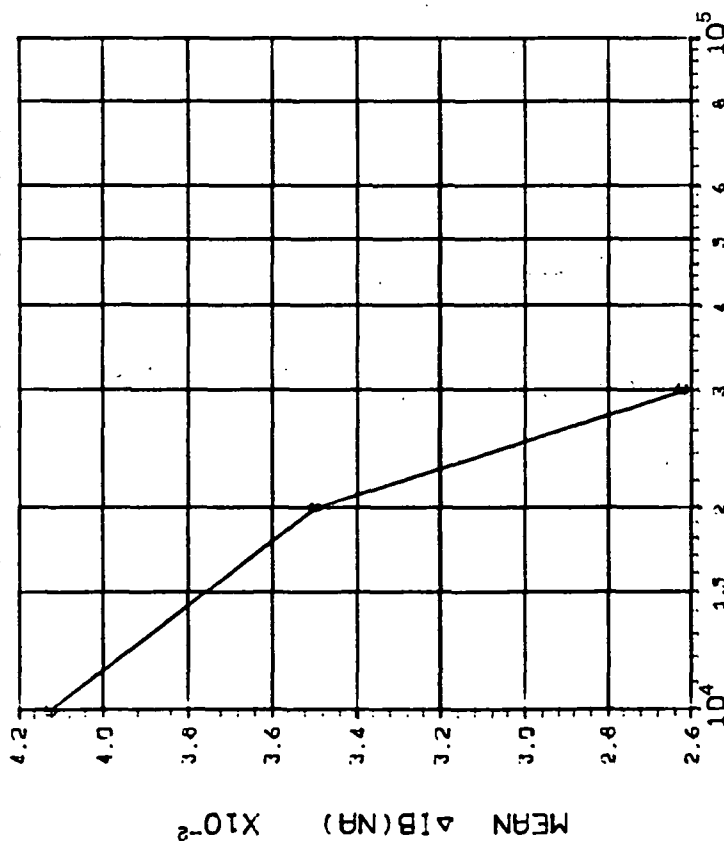
(2) $\Delta IOS(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | .0696 | .0288 .3627 ***** |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-27-83

REF: JPL LOG 0967-1 DATE CODE 8232



DOSE, rads(Si) Co⁶⁰ Gammas

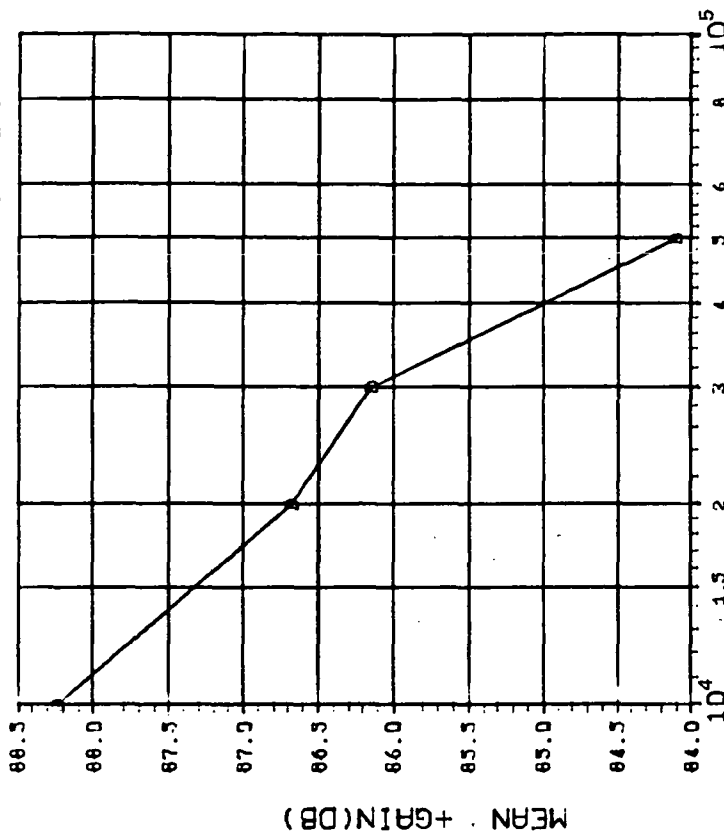
(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| C | 10 | 20 |
| | 30 | 50 |
| | .2086 | .2692 .2507 ***** |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-27-83

REF: JPL LOG 0967-1 DATE CODE 8232



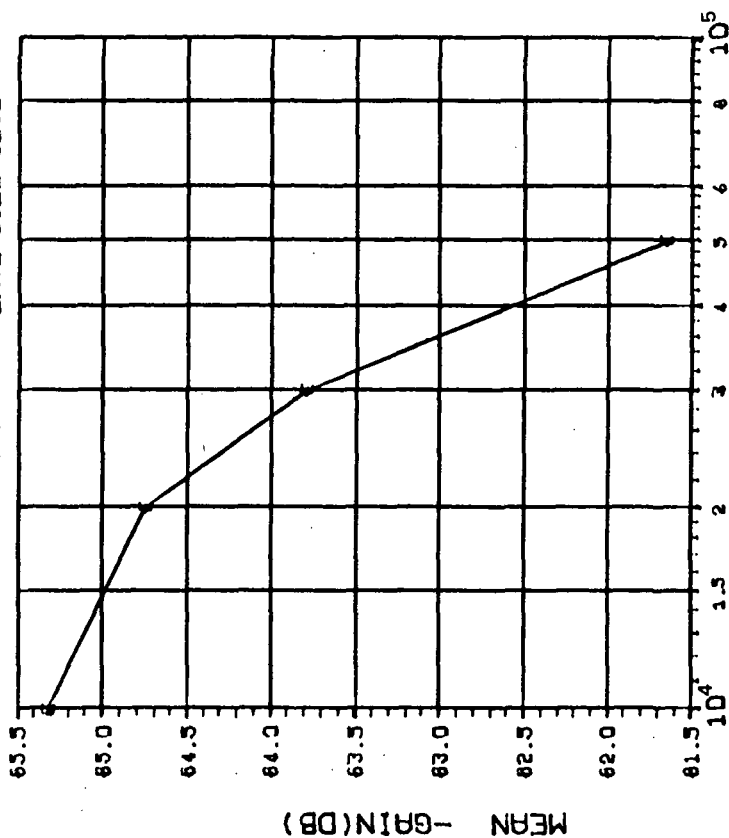
DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 10 20 30 50 |
| | 2.689 | 2.586 3.006 3.065 |
| | | |

INITIAL MEAN VALUE +GAIN(DB) = 8.90X10⁻¹

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)
 MFG: HPR 8 DEVICES TEST DATE 7-27-83
 REF: JPL LOG 0967-1 DATE CODE 6232



DOSE, rads(Si) Co⁶⁰ Gammas

(51)-GAIN(DB) VS DOSE

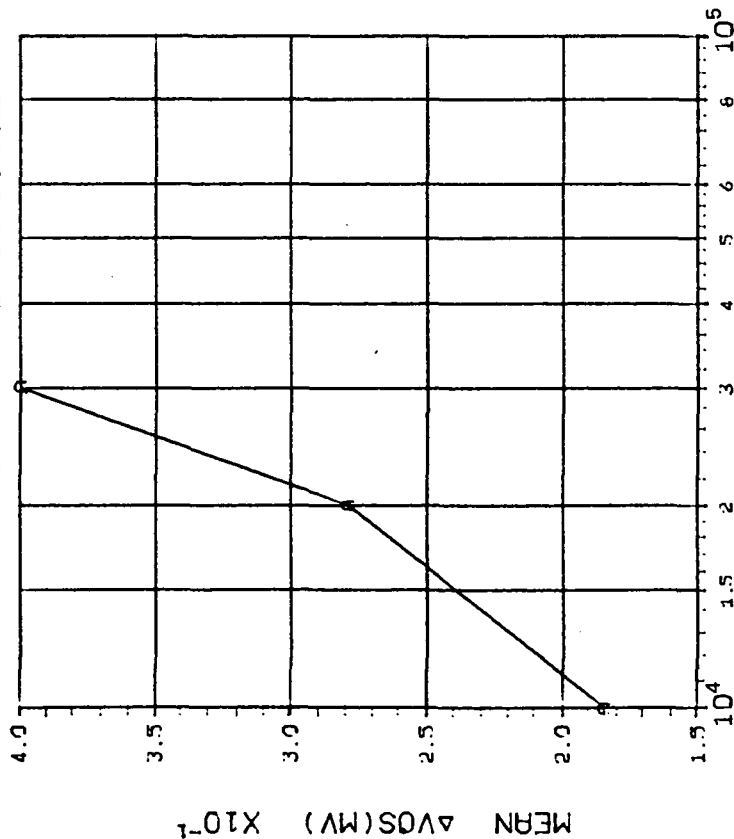
| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|--------------------|-------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| | | 10 | 20 30 50 |
| E | 1.00 | 2.571 | 2.524 2.139 3.364 |

INITIAL MEAN VALUE -GAIN(DB) = 6.69X10³

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0968-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas

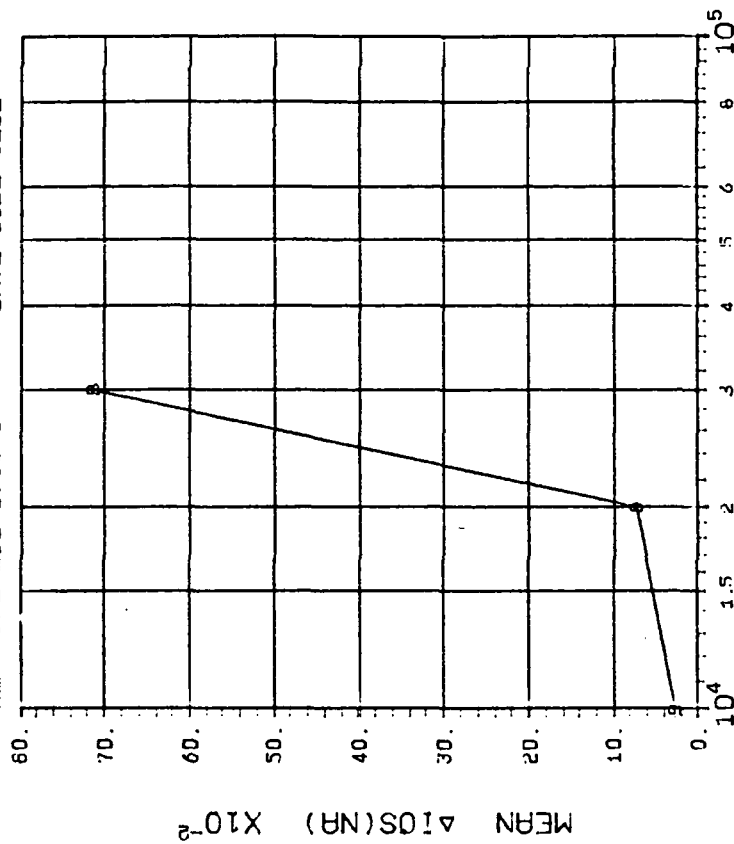
(1)ΔVOS(MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| A | .0529 | .0817 | .1176 | ***** |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HPR 8 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0968-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas

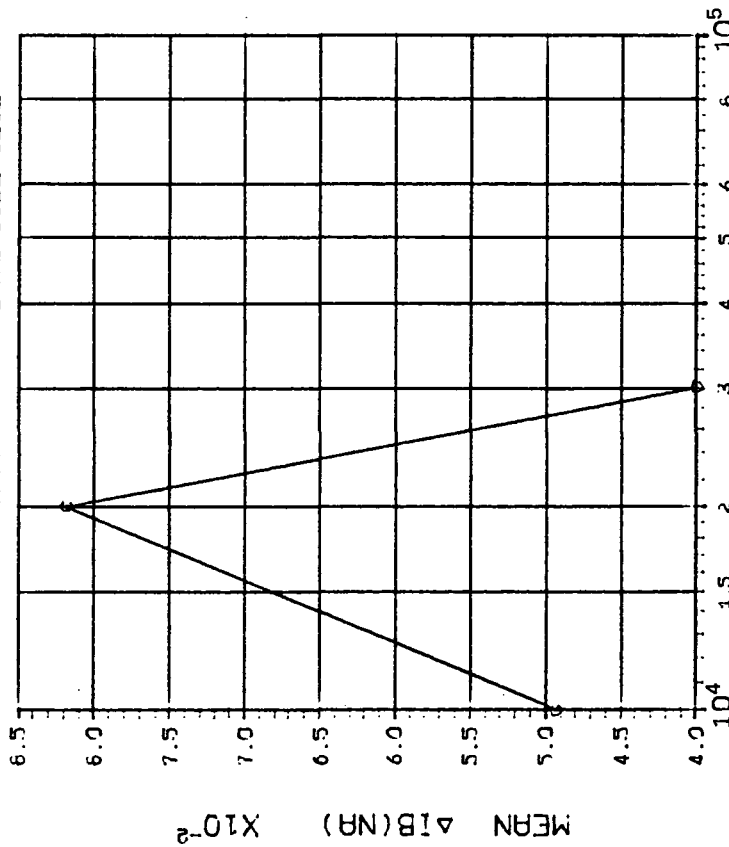
(2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| B | .0276 | .0424 | .3654 | ***** |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HAR 8 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0968-1 DATE CODE 8232



DOSE, rads(Si) Co 60 Gammas

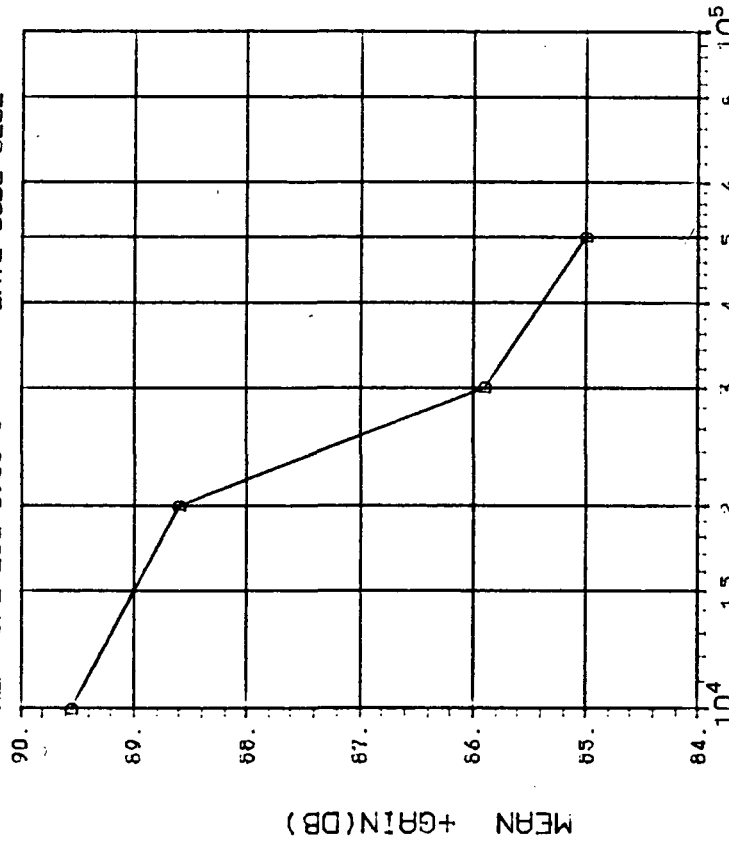
(3) ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .1622 | .2516 .2460 ***** |

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)

MFG: HAR 8 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0968-1 DATE CODE 8232



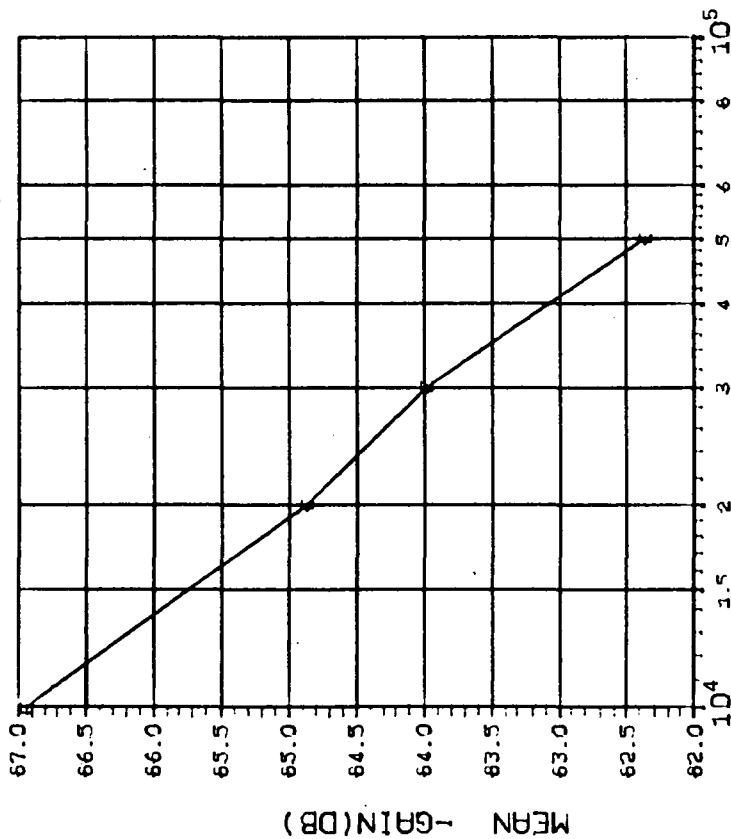
DOSE, rads(Si) Co 60 Gammas

(4) +GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| | | 10 20 30 50 |
| D | 1.00 | 2.284 2.130 3.229 2.760 |

INITIAL MEAN VALUE +GAIN(DB) = 9.06X10⁺¹

DEVICE TYPE: HA5064(JFET,QUAD OP AMP)
 MFG: HRR 8 DEVICES TEST DATE 7-28-63
 REF: JPL LOG 0966-1 DATE CODE 8232

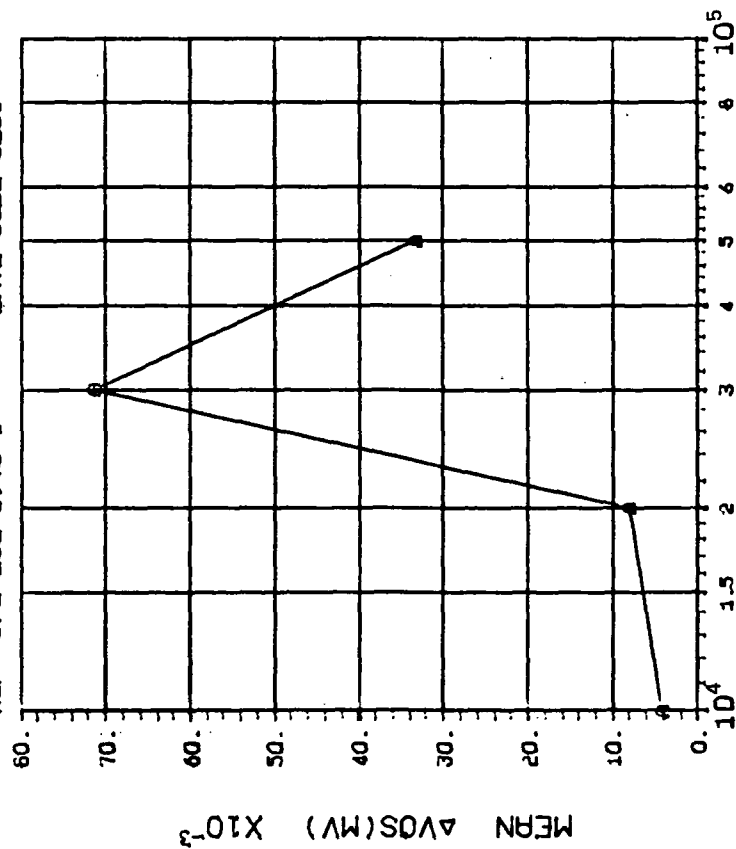


DOSE, rads(Si) Co⁶⁰ Gammas
 (5)-GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 2.651 1.726 1.766 1.712 |

INITIAL MEAN VALUE -GAIN(DB) = 6.77×10^{-2}

DEVICE TYPE: HRS141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 04-18-83
REF: JPL LOG 0975-1 DATE CODE 8251

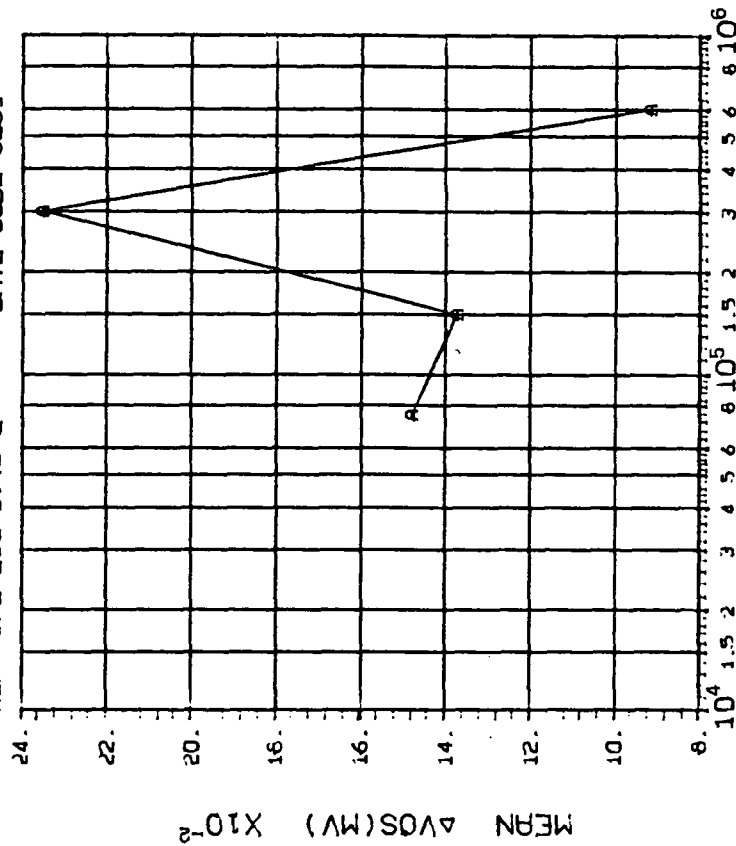


DOSE, rads(Si) Co⁶⁰ Gammas

(1) ΔVOS(MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0019 | .0051 .1293 .0162 |

DEVICE TYPE: HRS141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 04-18-83
REF: JPL LOG 0975-2 DATE CODE 8251

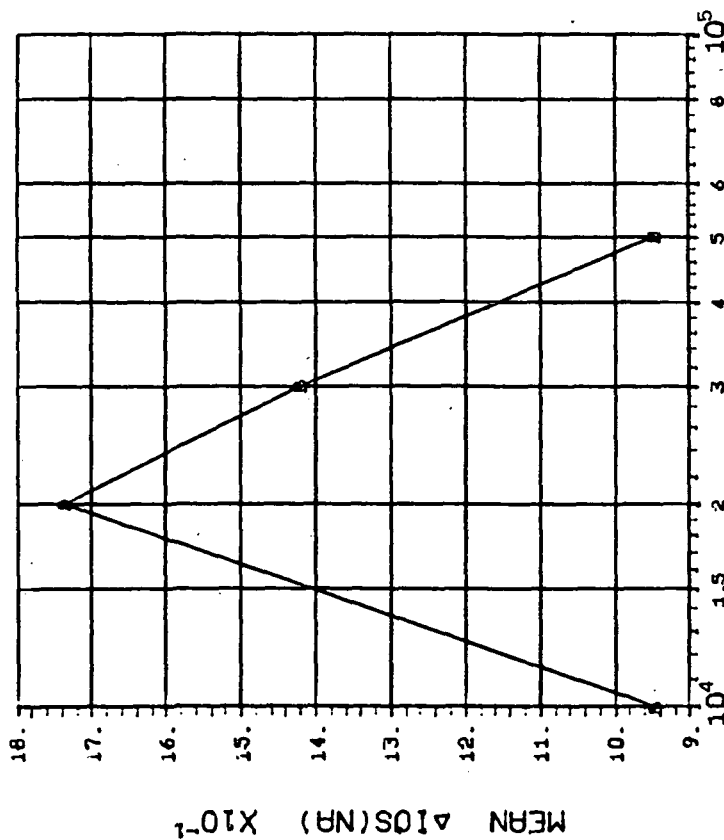


DOSE, rads(Si) Co⁶⁰ Gammas

(1) ΔVOS(MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .2016 | .0497 .0528 .0661 |

DEVICE TYPE: HPS141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0975-1 DATE CODE 8251

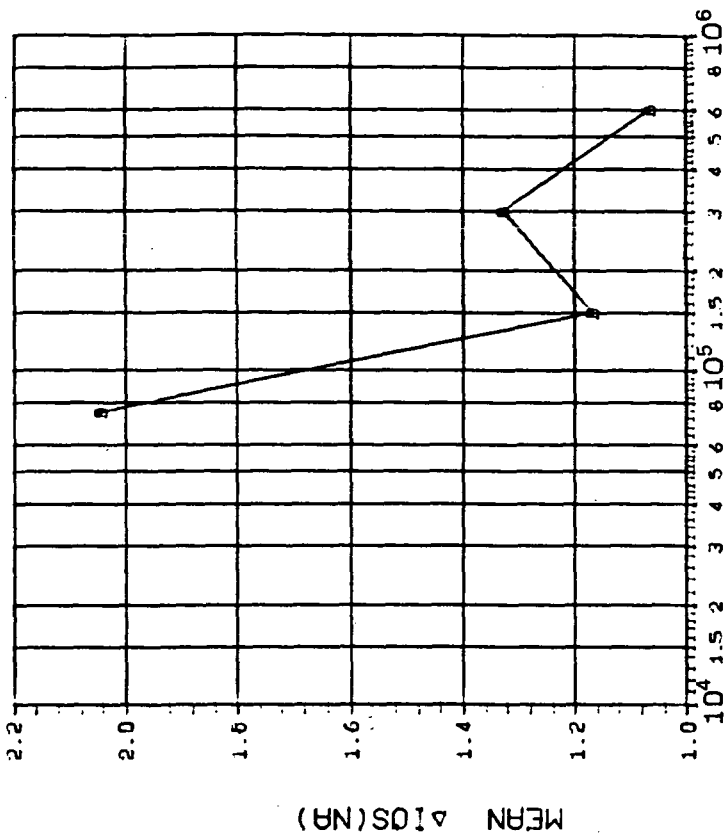


DOSE, rad(Si) Co 60 Gammas

(2) Δ IOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| B | 50 |
| | 1.116 |
| | 1.678 |
| B | 1.346 |
| | 1.147 |

DEVICE TYPE: HPS141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0975-2 DATE CODE 8251

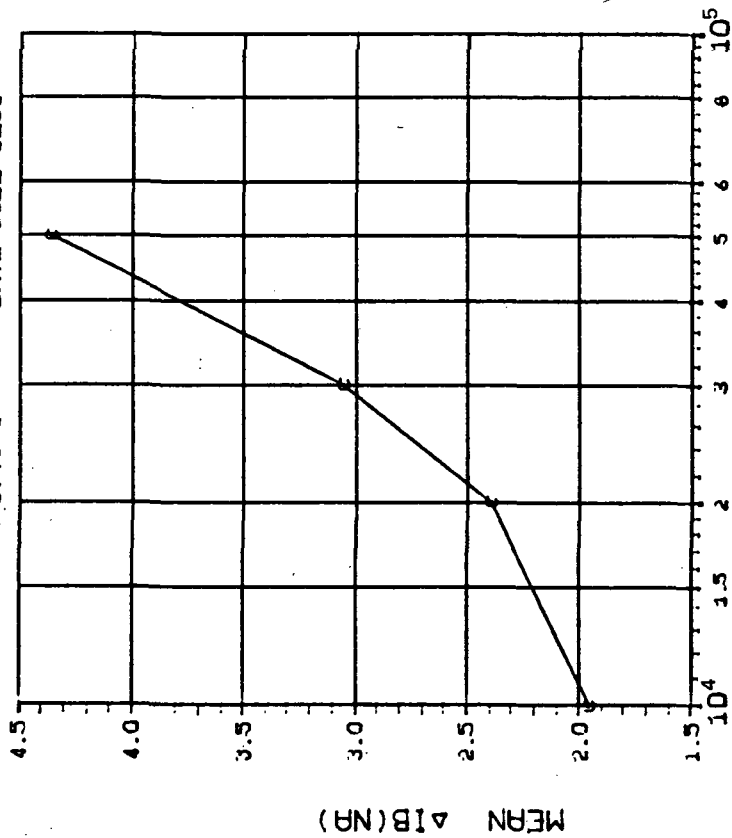


DOSE, rad(Si) Co 60 Gammas

(2) Δ IOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| B | 600 |
| | 1.745 |
| | .9553 |
| B | .8746 |
| | 1.196 |

DEVICE TYPE: HA5141A LOW POWER JFET OP AMP
 MFG: HRR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0975-1 DATE CODE 8251

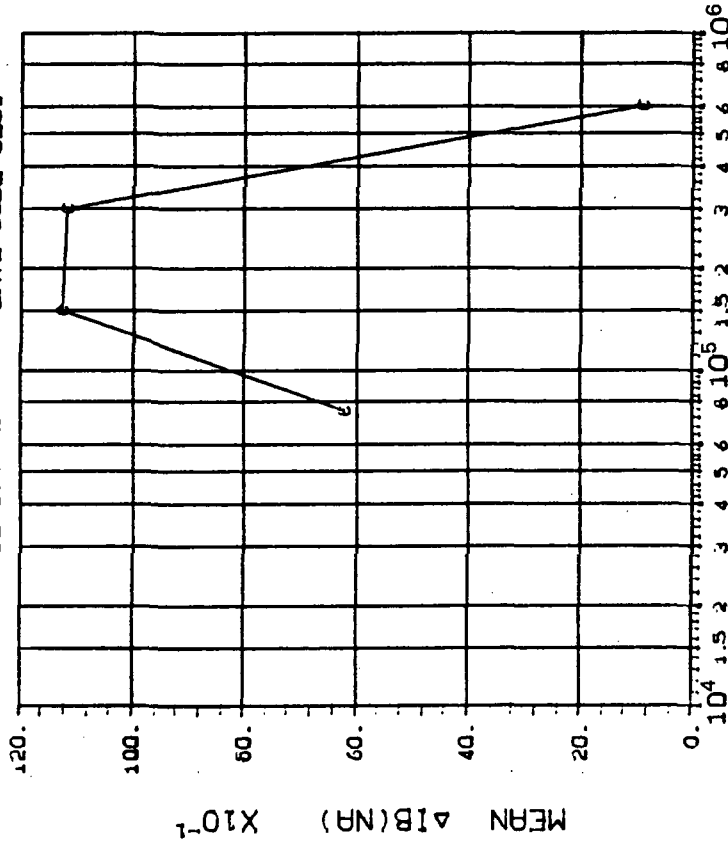


DOSE, rads(Si) Co 60 Gammas

(3) ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| 1.513 1.566 1.722 2.034 | |

DEVICE TYPE: HA5141A LOW POWER JFET OP AMP
 MFG: HRR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0975-2 DATE CODE 8251

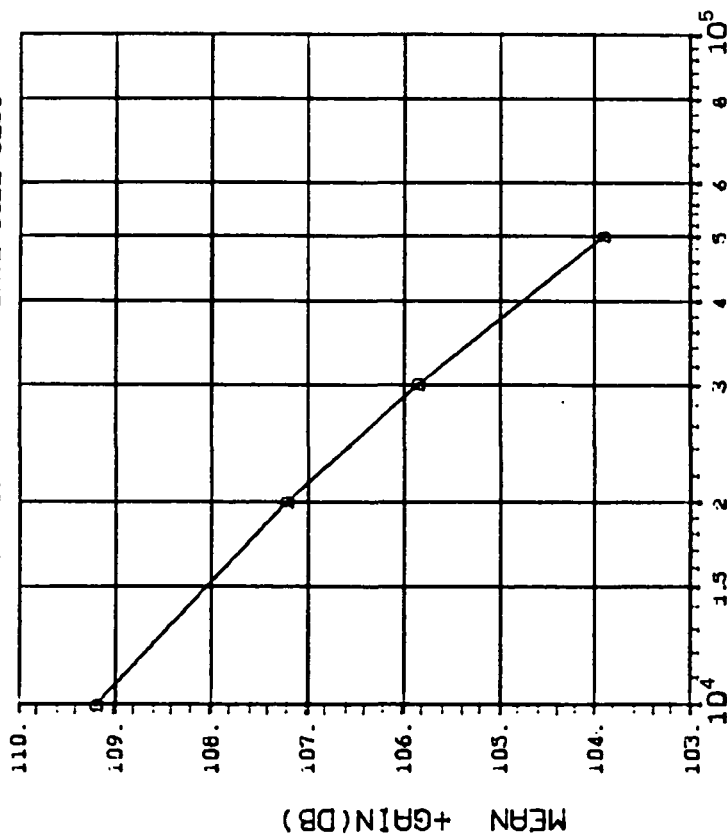


DOSE, rads(Si) Co 60 Gammas

(3) ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| 2.472 3.737 4.729 2.906 | |

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
 MFG: HRR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0975-1 DATE CODE 8251



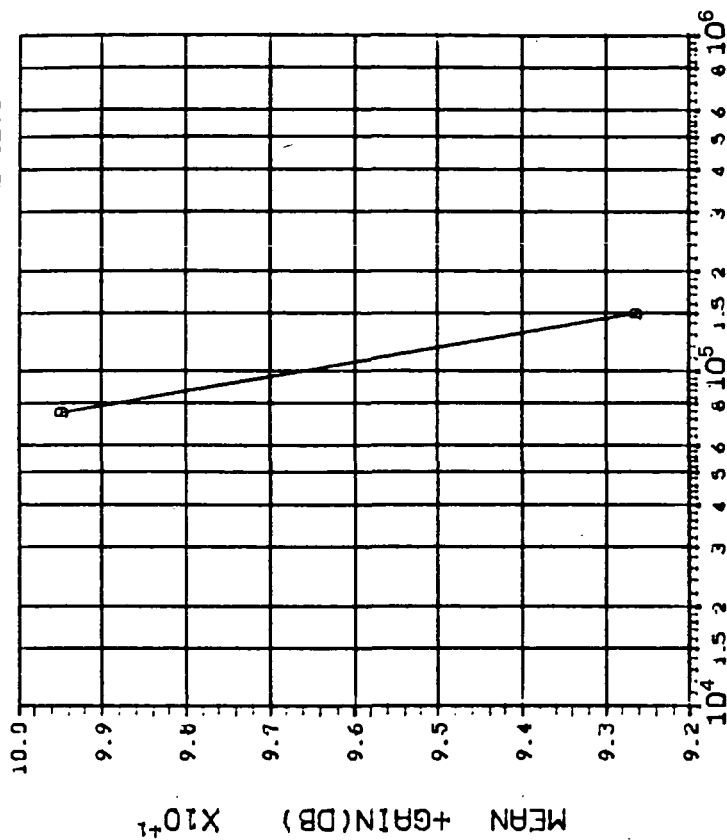
DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(800A LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | 80.0 | 6.256 7.507 5.671 4.928 |

INITIAL MEAN VALUE +GAIN(DB) = 1.11X10¹²

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
 MFG: HRR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0975-2 DATE CODE 8251



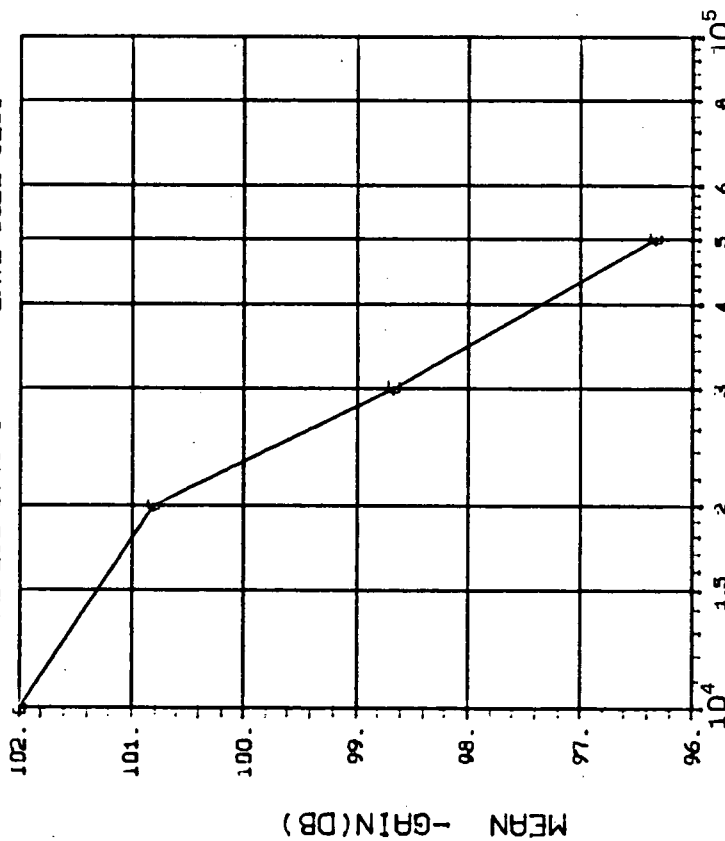
DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(800A LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | 80.0 | 75 150 300 600 |
| D | 80.0 | 2.834 2.427 ***** |

INITIAL MEAN VALUE +GAIN(DB) = 1.11X10¹²

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 04-18-83
REF: JPL LOG 0975-1 DATE CODE 8251

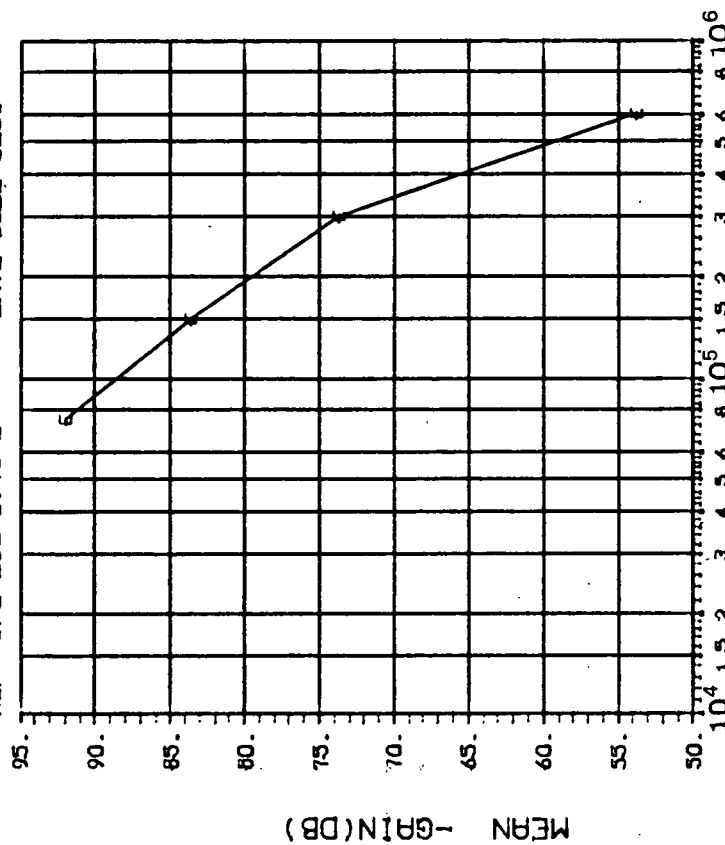


DOSE, rads(Si) Co 60 Gammas
(5)-GAIN IN DB(80uA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 10 20 30 50 |
| | | 9.057 7.281 6.751 6.216 |

INITIAL MEAN VALUE -GAIN(DB) = 1.04X10¹²

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 04-18-83
REF: JPL LOG 0975-2 DATE CODE 8251



DOSE, rads(Si) Co 60 Gammas
(5)-GAIN IN DB(80uA LOAD, -10V): VS DOSE

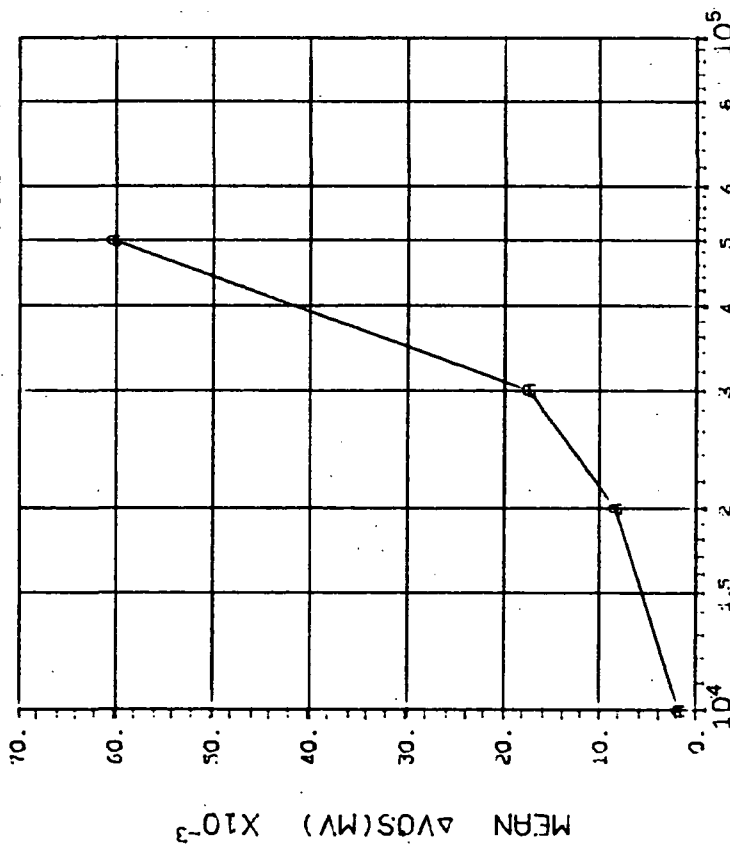
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 75 150 300 600 |
| | | 6.917 4.926 4.930 3.073 |

INITIAL MEAN VALUE -GAIN(DB) = 1.04X10¹²

DEVICE TYPE: H95141A LOW POWER JFET OP AMP

MFG: HQR 6 DEVICES TEST DATE 04-18-83

REF: JPL LOG 0976-1 DATE CODE 8251



DOSE, rads(Si) Co ⁶⁰ Gammas

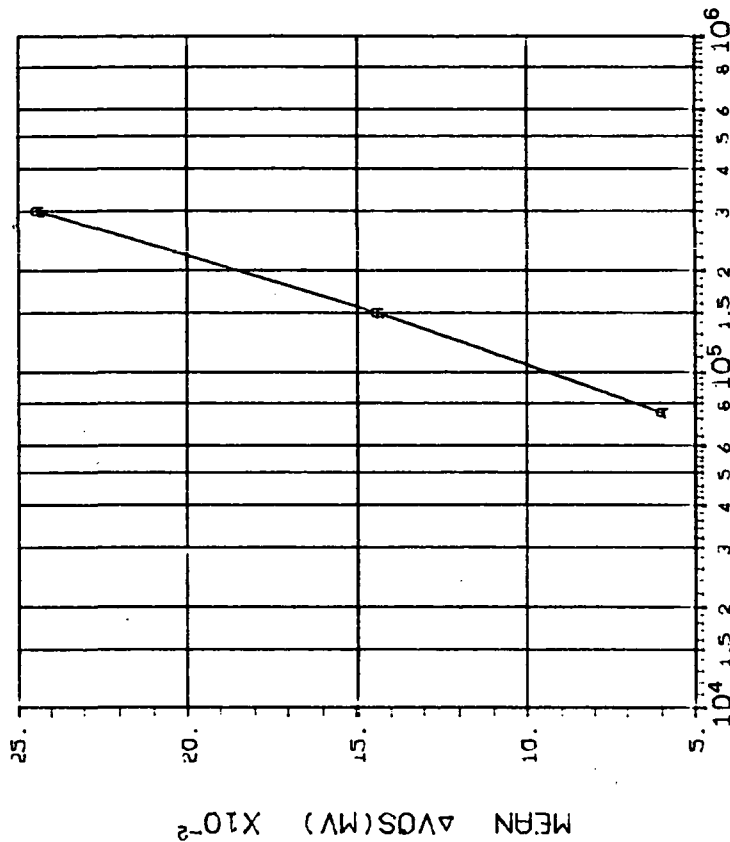
(1) ΔV_{OS} (MV):VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0011 | .0032 .0066 .0565 |

DEVICE TYPE: H95141A LOW POWER JFET OP AMP

MFG: HQR 6 DEVICES TEST DATE 04-18-83

REF: JPL LOG 0976-2 DATE CODE 8251

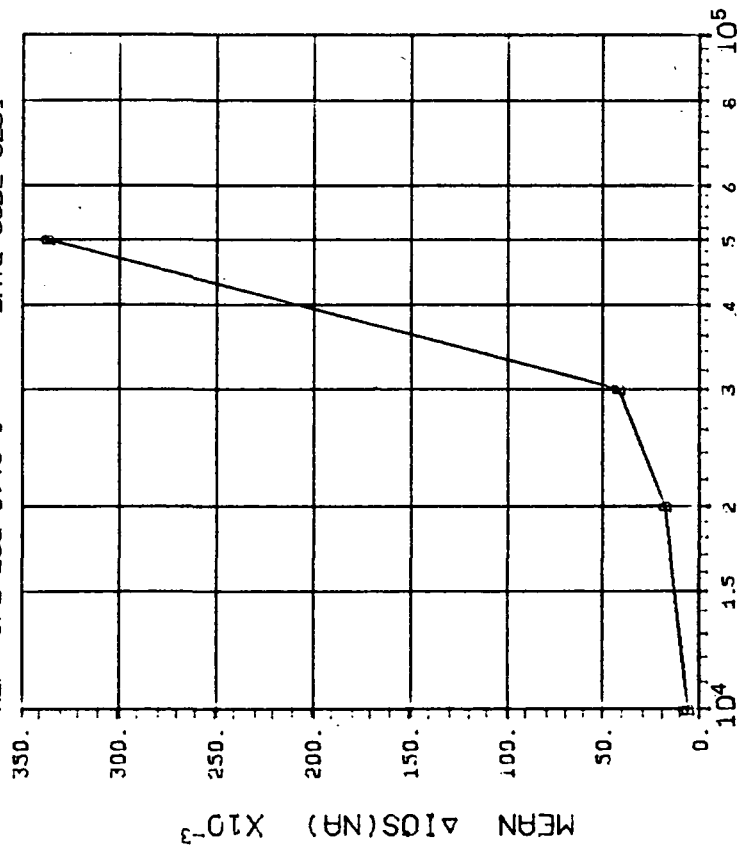


DOSE, rads(Si) Co ⁶⁰ Gammas

(1) ΔV_{OS} (MV):VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .0262 | .0506 .0717 ***** |

DEVICE TYPE: HA5141A LOW POWER JFET OP AMP
 MFG: HAR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-1 DATE CODE 8251

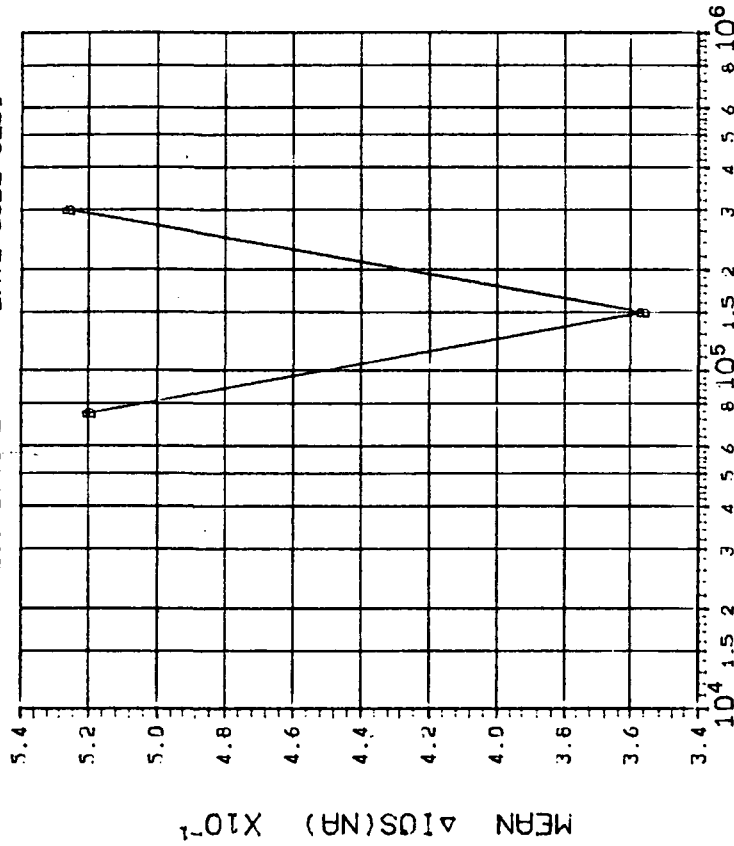


DOSE, rads(Si) Co 60 Gammas

(2)ΔIOS(NA):VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| | 50 |
| .0037 .0143 .0344 .5790 | |

DEVICE TYPE: HA5141A LOW POWER JFET OP AMP
 MFG: HAR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-2 DATE CODE 8251

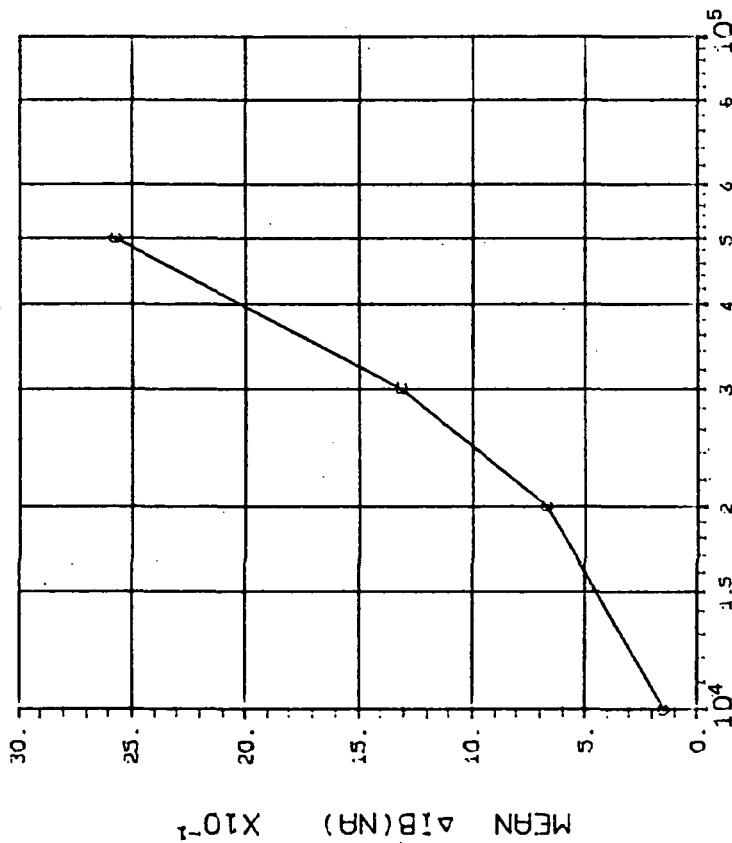


DOSE, rads(Si) Co 60 Gammas

(2)ΔIOS(NA):VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| .7907 .1720 .1799 ***** | |

DEVICE TYPE: H05141A LOW POWER JFET OP AMP
 MFG: H0R 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-1 DATE CODE 8251

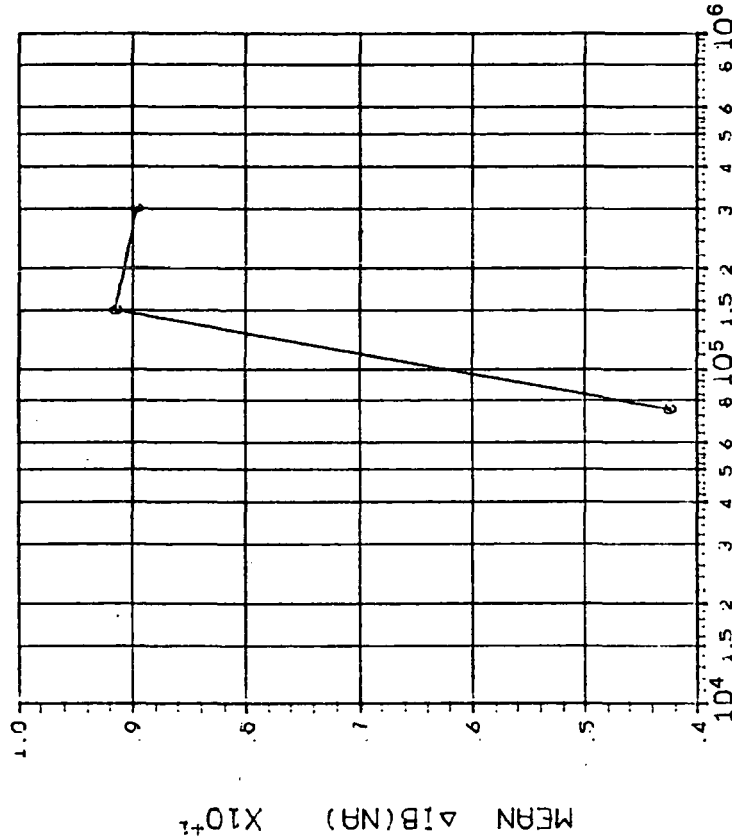


DOSE, rads(Si) Co 60 Gammas

(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| .0509 .2650 .5265 1.028 | |

DEVICE TYPE: H05141A LOW POWER JFET OP AMP
 MFG: H0R 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-2 DATE CODE 8251

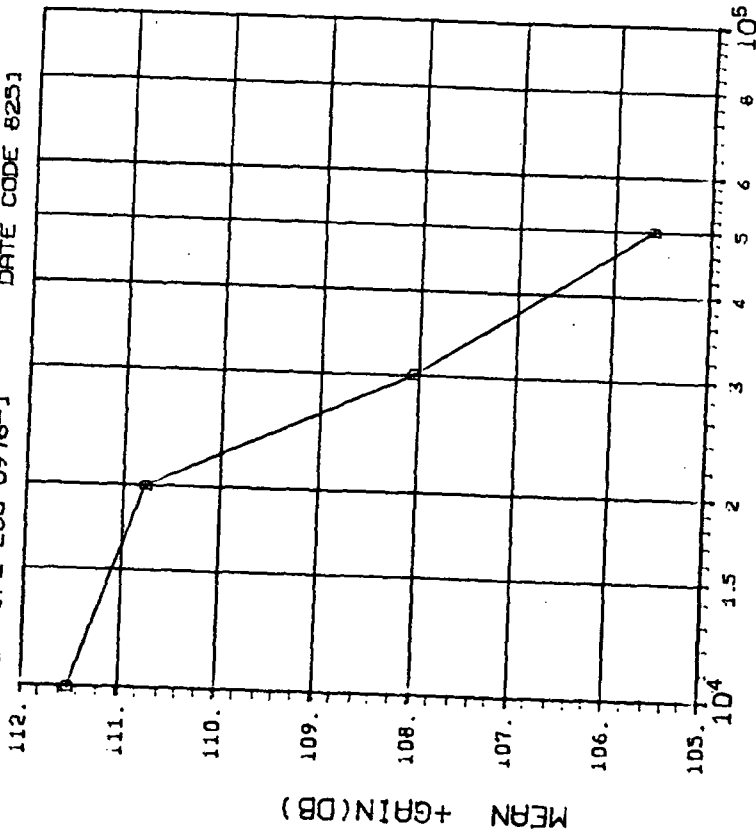


DOSE, rads(Si) Co 60 Gammas

(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| 1.666 3.412 2.945 ***** | |

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
 MFG: HRR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-1 DATE CODE 8251



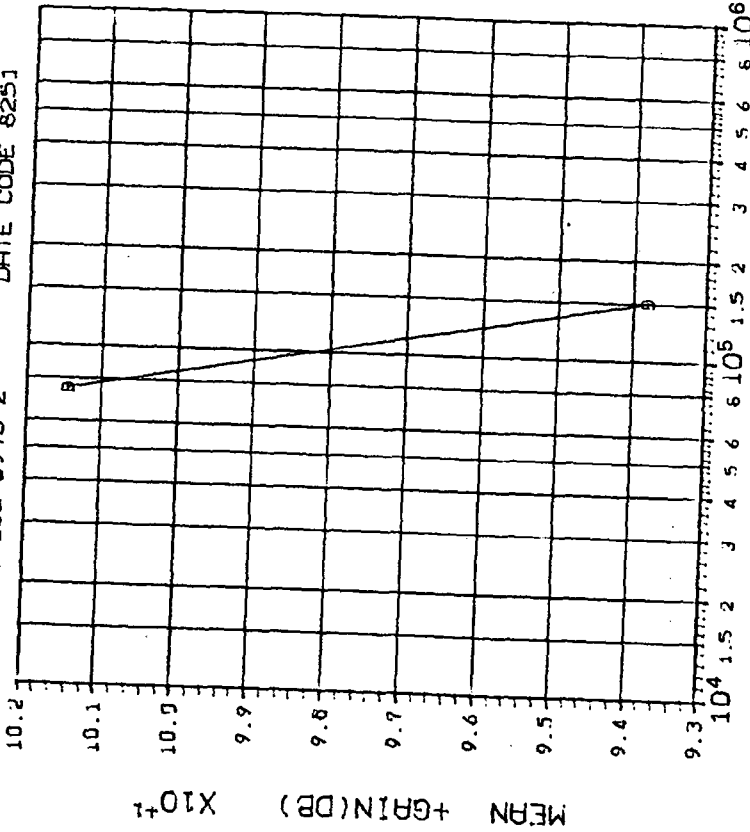
DOSE, rads(Si) Co 60 Gammas

(4) + GAIN IN DB (80uA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | 80.0 | 10 20 30 50 |
| | | .8178 1.118 1.326 .6669 |

INITIAL MEAN VALUE + GAIN (DB) = 1.13X10⁺²

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
 MFG: HRR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-2 DATE CODE 8251



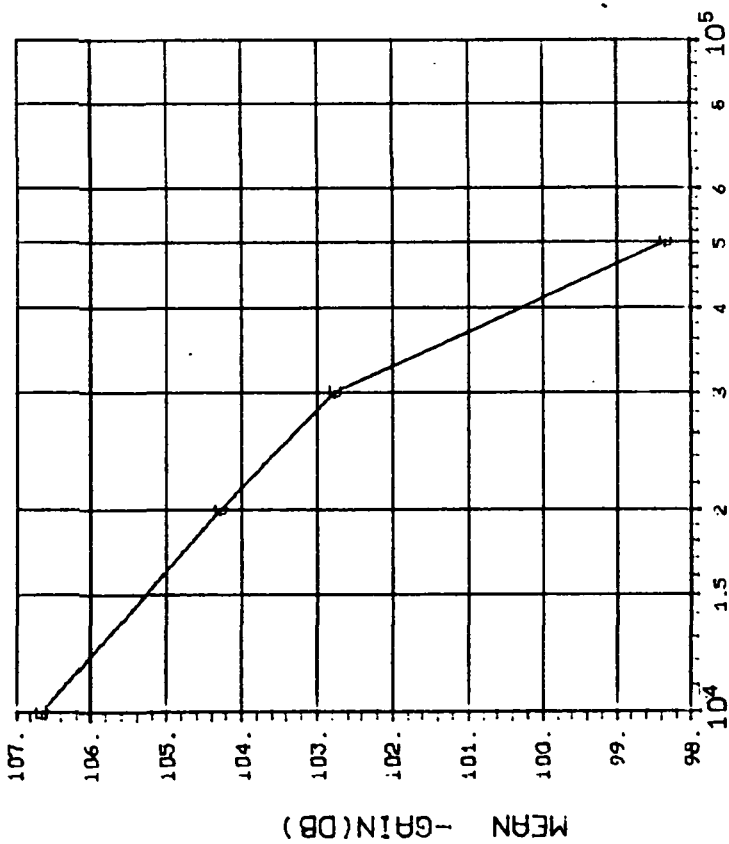
DOSE, rads(Si) Co 60 Gammas

(4) + GAIN IN DB (80uA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | 80.0 | 75 150 300 600 |
| | | .6458 .9402 ***** |

INITIAL MEAN VALUE + GAIN (DB) = 1.13X10⁺²

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-1 DATE CODE 8251

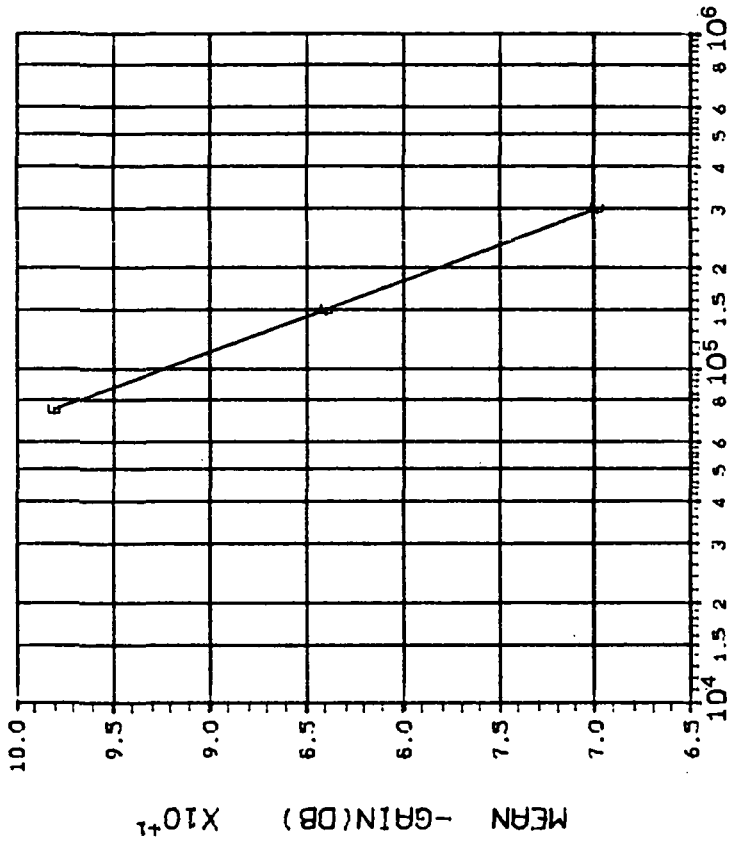


DOSE, rads(Si) Co 60 Gammas
 (5)-GAIN IN DB(80uA LOAD, -10V) : VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 10 20 30 50 |
| | | .7829 1.302 1.331 1.001 |

INITIAL MEAN VALUE -GAIN(DB) = 1.07X10⁴²

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 04-18-83
 REF: JPL LOG 0976-2 DATE CODE 8251

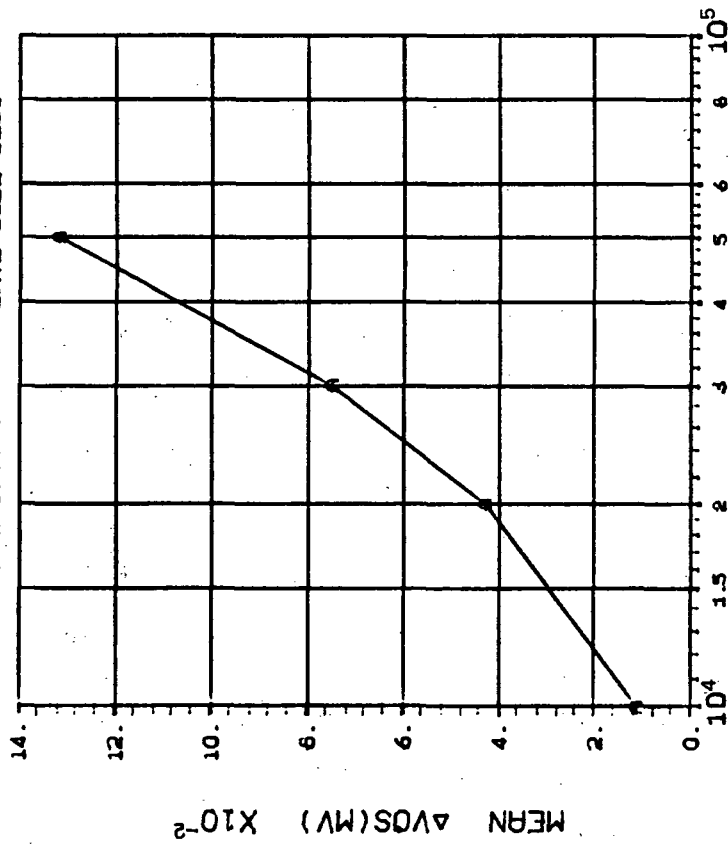


DOSE, rads(Si) Co 60 Gammas
 (5)-GAIN IN DB(80uA LOAD, -10V) : VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 75 150 300 600 |
| | | 1.499 1.029 1.602 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 1.07X10⁴²

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 04-20-83
REF: JPL LOG 0977-1 DATE CODE 8251

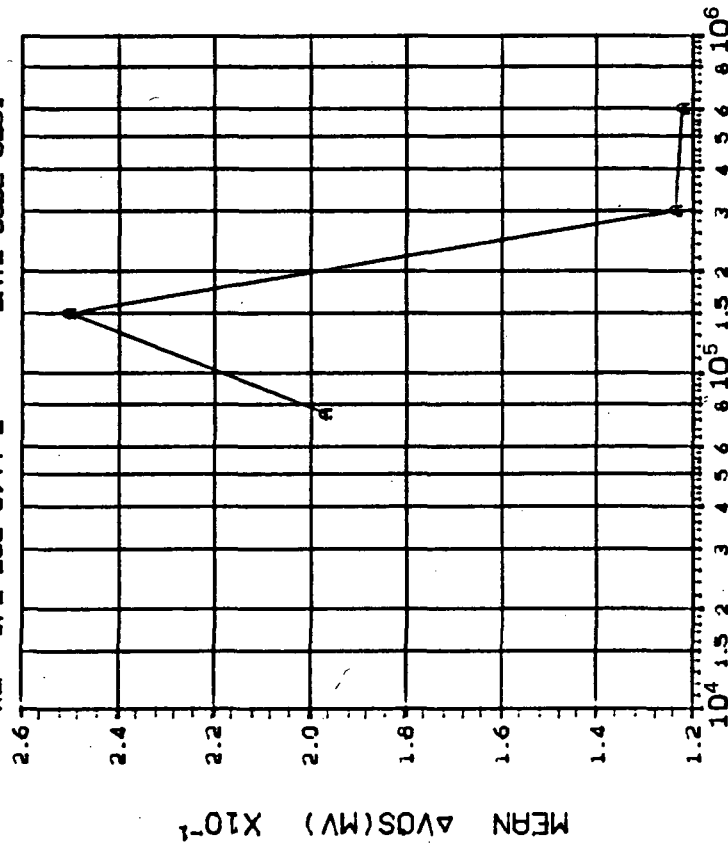


DOSE, rads(Si) 2.5 MeV electrons

(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0016 | .0062 .0114 .0233 |

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 4-20-83
REF: JPL LOG 0977-2 DATE CODE 8251

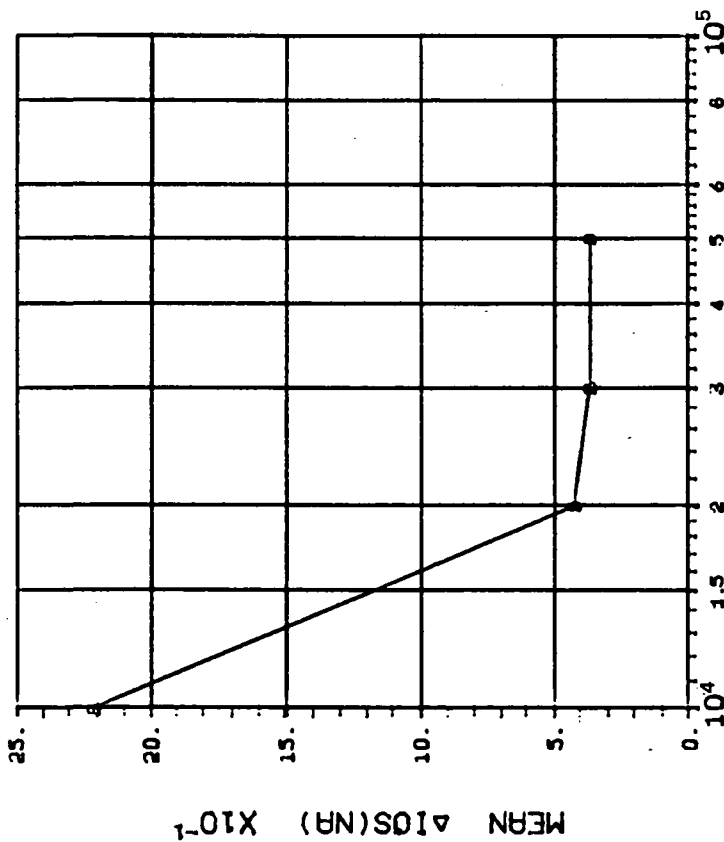


DOSE, rads(Si) 2.5 MeV electrons

(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .0333 | .0416 .0891 .0857 |

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 04-20-83
 REF: JPL LOG 0977-1 DATE CODE 8251

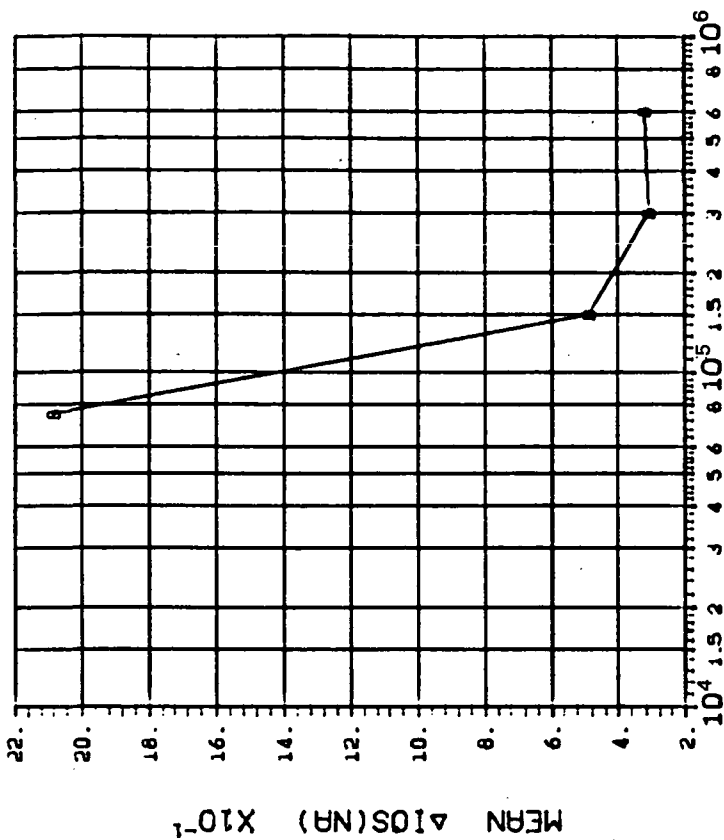


DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NR): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | 3.272 | .4670 .3587 .3848 |

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 4-20-83
 REF: JPL LOG 0977-2 DATE CODE 8251

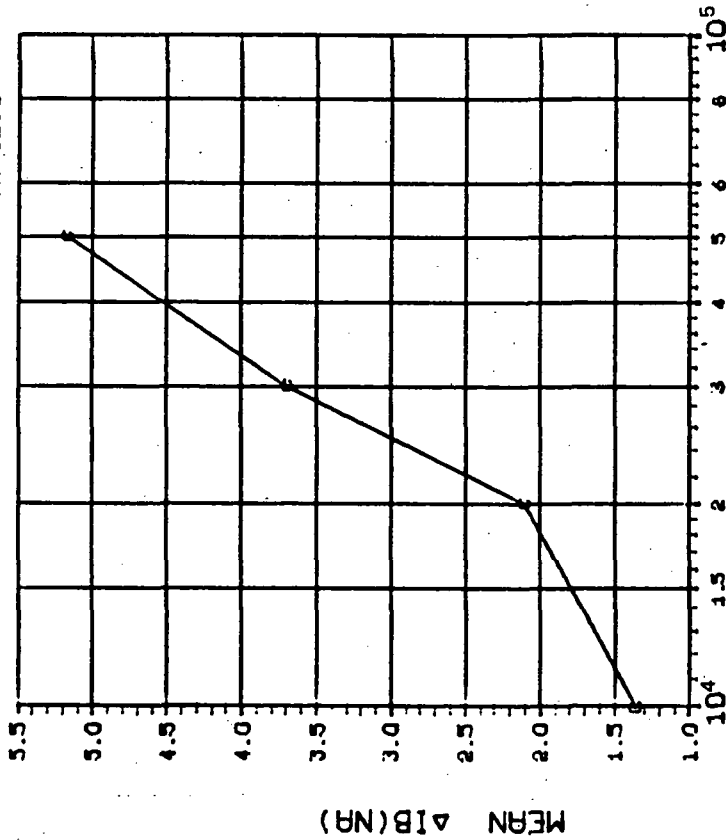


DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NR): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| B | 3.962 | .5909 .4552 .3627 |

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
MFG: HRR 6 DEVICES TEST DATE 04-20-83
REF: JPL LOG 0977-1 DATE CODE 8251

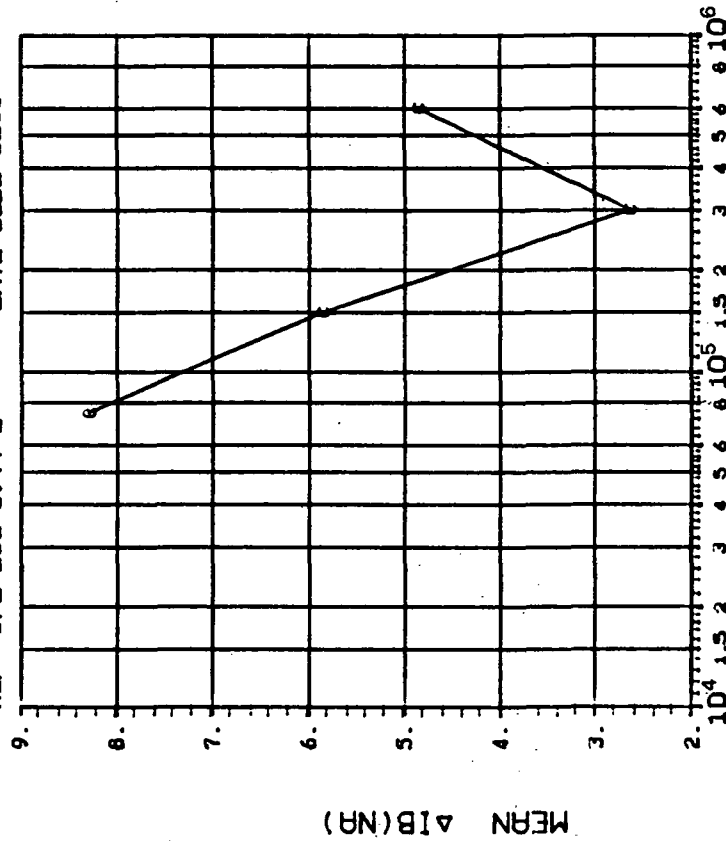


DOSE, rads(Si) 2.5 MeV electrons

(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 |
| C | 2.945 | 2.093 |
| | 30 | 50 |
| | 1.723 | 3.258 |

DEVICE TYPE: H95141A LOW POWER JFET OP AMP
MFG: HRR 6 DEVICES TEST DATE 4-20-83
REF: JPL LOG 0977-2 DATE CODE 8251

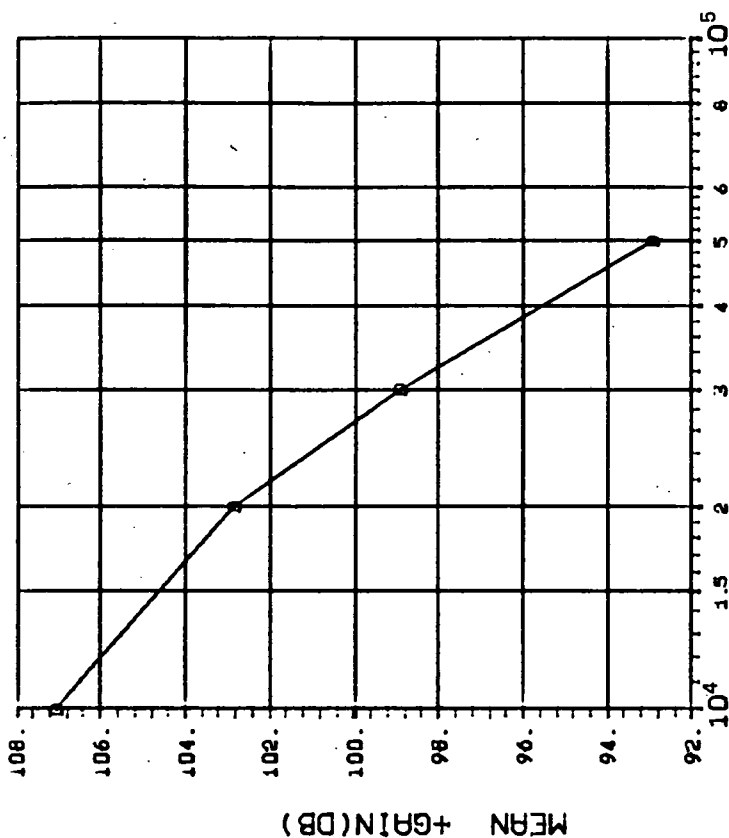


DOSE, rads(Si) 2.5 MeV electrons

(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 |
| C | 2.993 | 3.502 |
| | 300 | 600 |
| | 2.630 | 2.764 |

DEVICE TYPE: HAS141A LOW POWER JFET OP AMP
 MFG: HAR 6 DEVICES TEST DATE 04-20-83
 REF: JPL LOG 0977-1 DATE CODE 8251

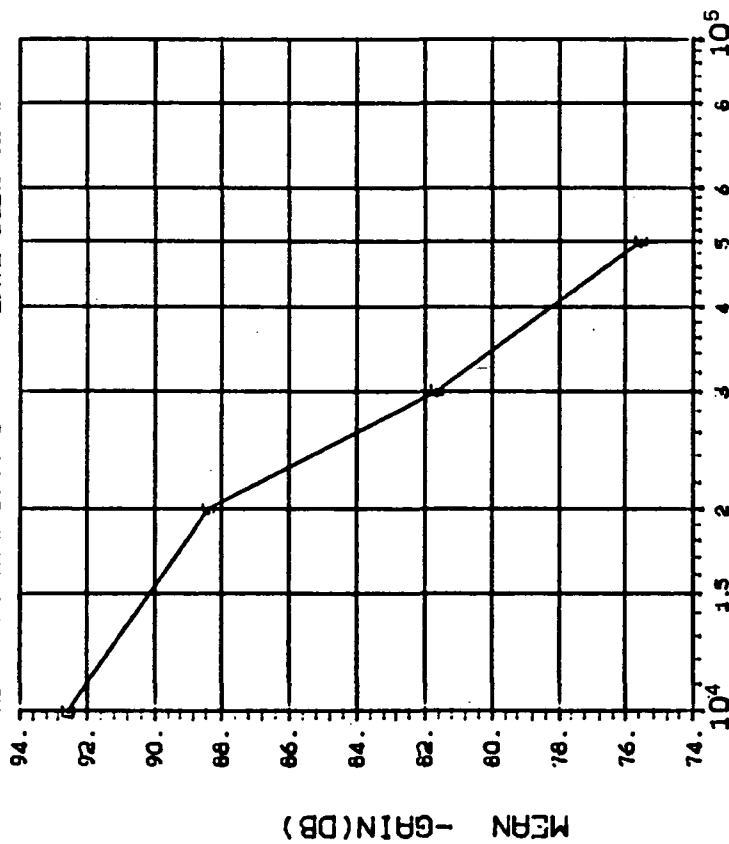


DOSE, rads(Si) 2.5 MeV electrons
 (4)+GAIN IN DB(80uA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|----------------------|-------------------------|
| CURVE | I_L (μA) | DOSE, kilorads(Si) |
| D | 80.0 | 10 |
| | | 20 |
| | | 30 |
| | | 50 |
| | | 1.173 1.131 1.345 1.916 |

INITIAL MEAN VALUE +GAIN(DB) = 1.10X10¹²

DEVICE TYPE: HRS141A LOW POWER JFET OP AMP
MFG: HRR 6 DEVICES TEST DATE 04-20-83
REF: JPL LOG 0977-1 DATE CODE 8251



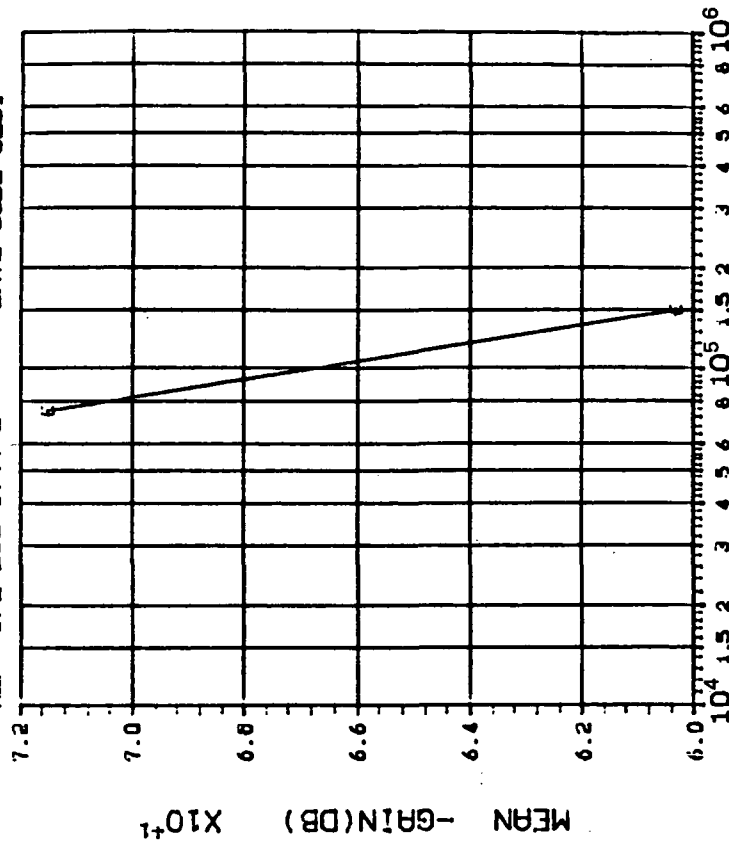
DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(80uA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------|-------------------------|
| CURVE | 1L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 1.962 1.694 1.930 1.907 |

INITIAL MEAN VALUE -GAIN(DB) = 9.78X10¹¹

DEVICE TYPE: HRS141A LOW POWER JFET OP AMP
MFG: HRR 6 DEVICES TEST DATE 4-20-83
REF: JPL LOG 0977-2 DATE CODE 8251



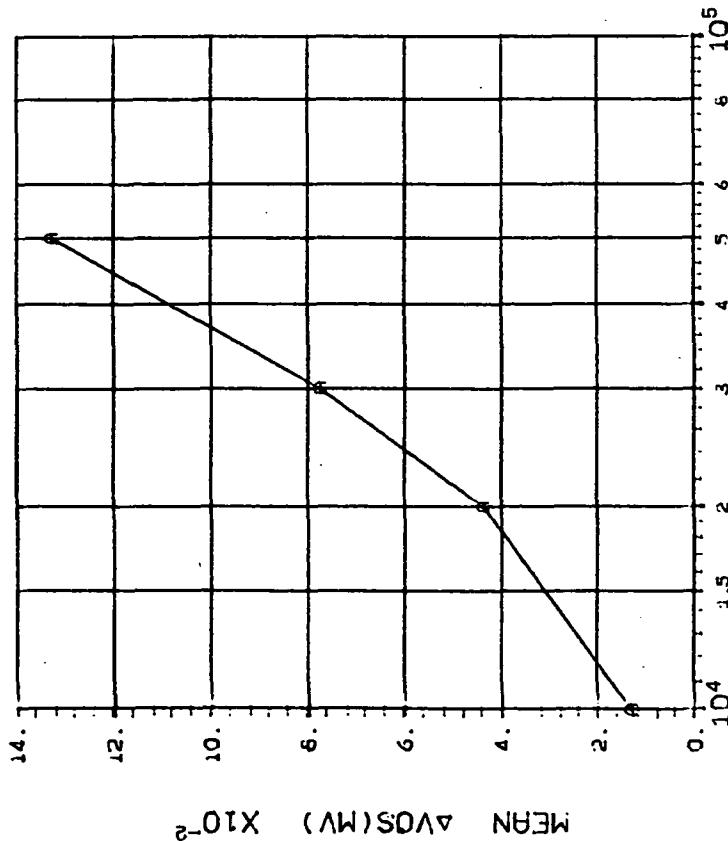
DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(80uA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------|--------------------|
| CURVE | 1L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 75 150 300 600 |

INITIAL MEAN VALUE -GAIN(DB) = 9.78X10¹¹

DEVICE TYPE: HAS141A LOW POWER JFET OP AMP
 MFG: H&R 6 DEVICES TEST DATE 04-20-83
 REF: JPL LOG 0978-1 DATE CODE 8251

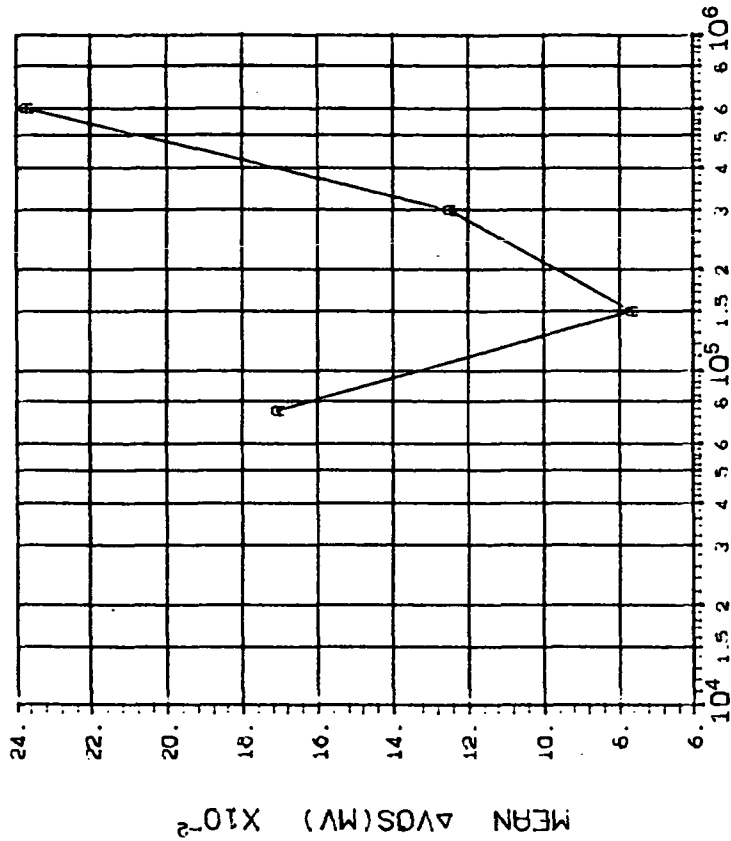


DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| | 10 20 30 50 |
| A | .0051 .0173 .0180 .0216 |

DEVICE TYPE: HAS141A LOW POWER JFET OP AMP
 MFG: H&R 6 DEVICES TEST DATE 01-28-83
 REF: JPL LOG 0978-2 DATE CODE 8251

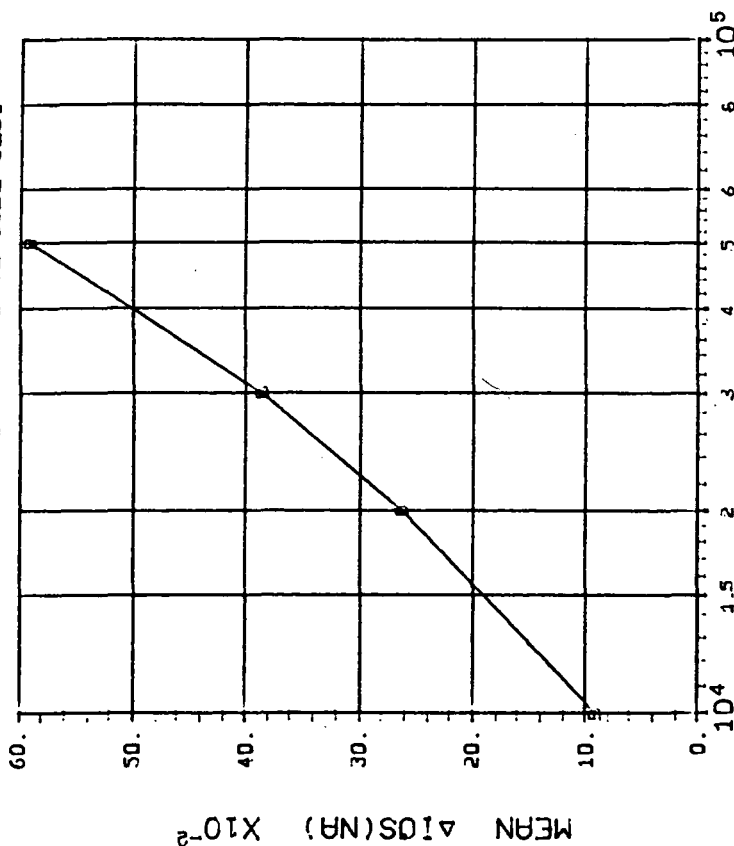


DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 150 300 600 |
| A | .0237 .0618 .0500 .2461 |

DEVICE TYPE: HQ5141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 04-20-83
 REF: JPL LOG 0978-1 DATE CODE 8251

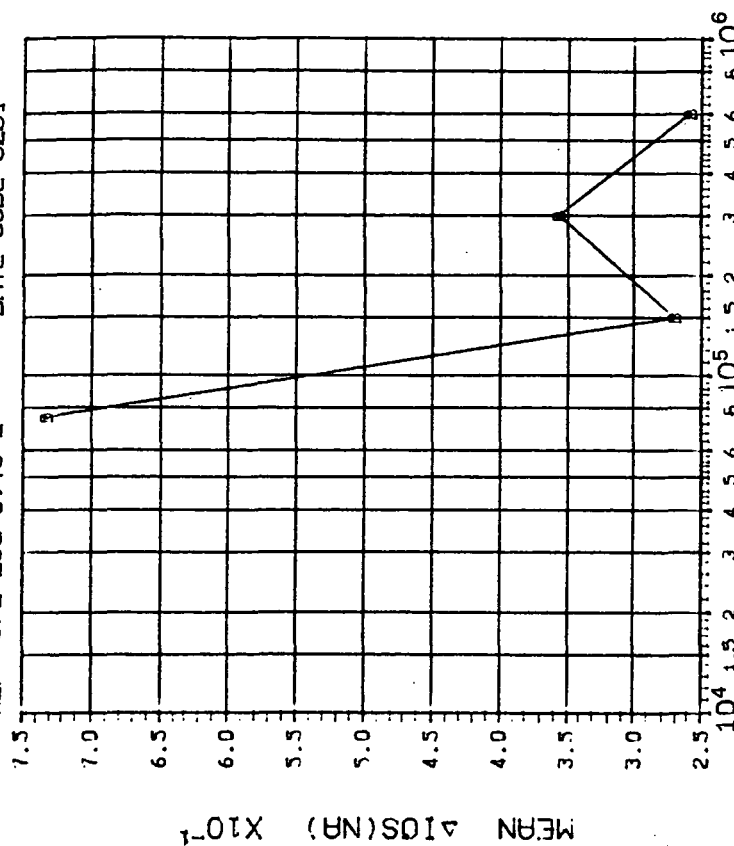


DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| B | 50 |
| | 1065 |
| | 2889 |
| B | 4597 |
| | 5584 |
| | |

DEVICE TYPE: HQ5141A LOW POWER JFET OP AMP
 MFG: HPR 6 DEVICES TEST DATE 01-28-83
 REF: JPL LOG 0978-2 DATE CODE 8251

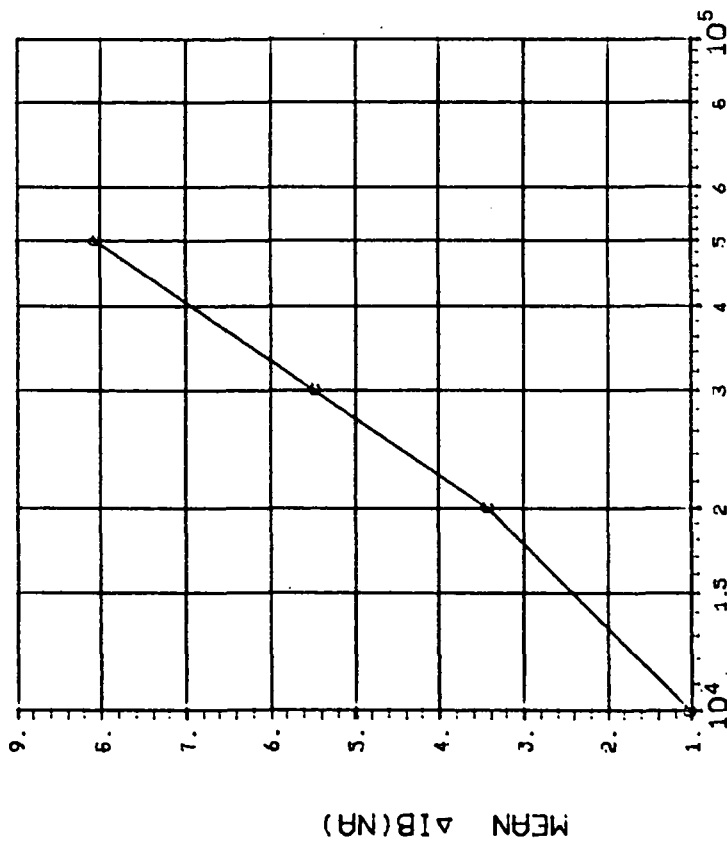


DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| B | 600 |
| | 1759 |
| | 2573 |
| B | 3787 |
| | |
| | |

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 04-20-83
REF: JPL LOG 0978-1 DATE CODE 8251

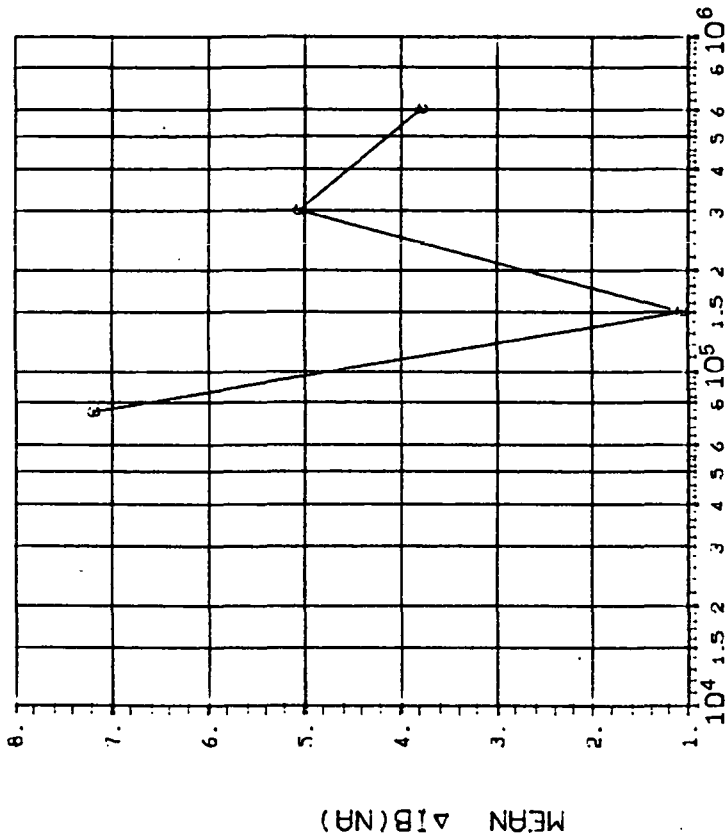


DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .6606 | 1.078 1.276 1.221 |

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 01-28-83
REF: JPL LOG 0978-2 DATE CODE 8251

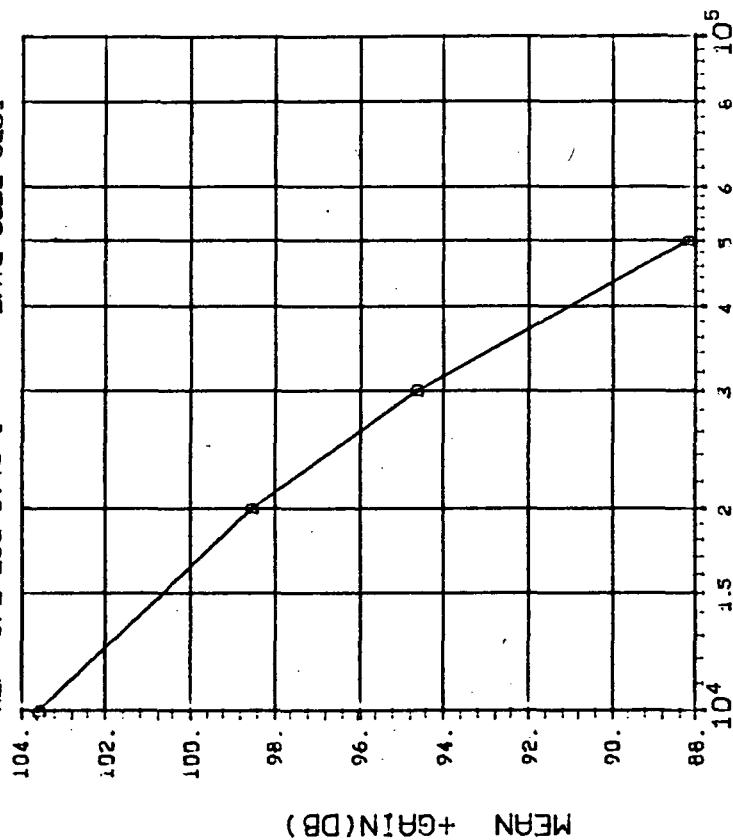


DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| C | 1.377 | 3.208 2.077 3.526 |

DEVICE TYPE: H85141A LOW POWER JFET OP AMP
 MFG: HRR 6 DEVICES TEST DATE 04-20-83
 REF: JPL LOG 0978-1 DATE CODE 8251



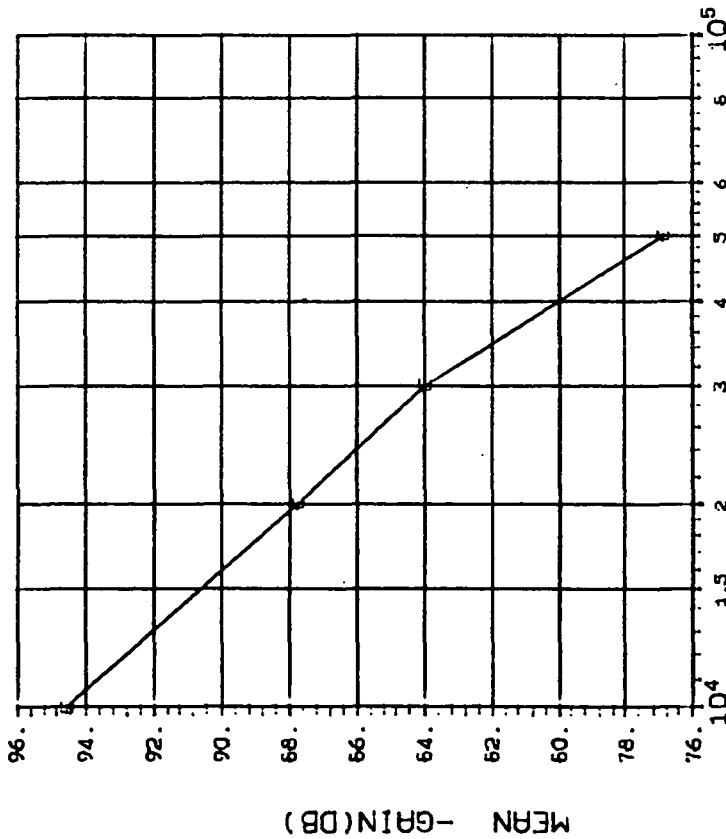
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(80uA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| | 10 | 20 30 50 |
| D | 80.0 | 8.360 5.761 5.159 3.476 |

INITIAL MEAN VALUE +GAIN(DB) = 1.07X10⁺²

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 04-20-83
REF: JPL LOG 0978-1 DATE CODE 8251



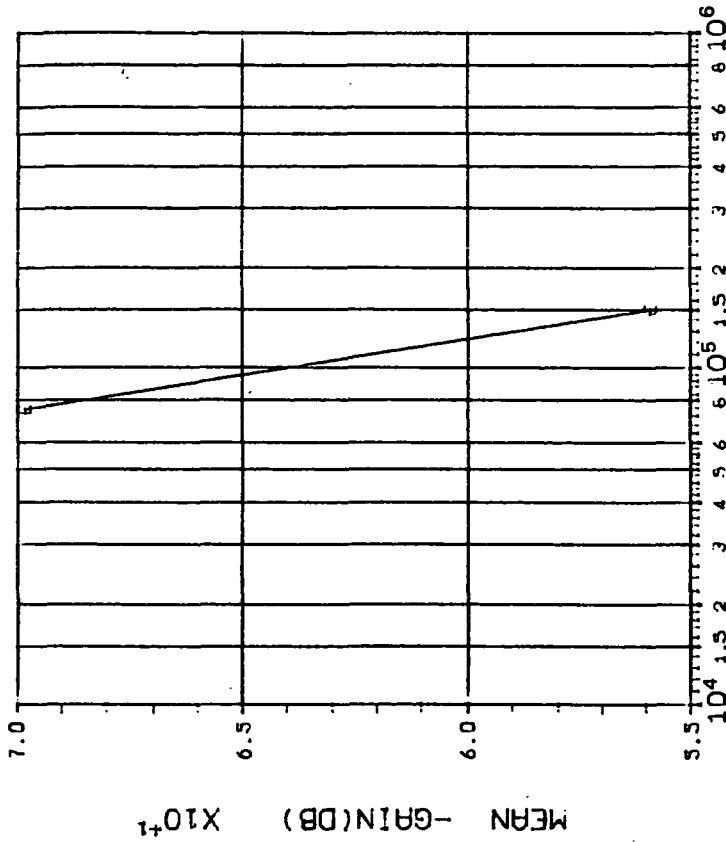
DOSE, rads(Si) 2.5 MeV electrons

(S)-GAIN IN DB(80uA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 11.56 9.723 5.427 6.641 |

INITIAL MEAN VALUE -GAIN(DB) = 9.85X10⁻³

DEVICE TYPE: H45141A LOW POWER JFET OP AMP
MFG: HPR 6 DEVICES TEST DATE 01-28-83
REF: JPL LOG 0978-2 DATE CODE 8251



DOSE, rads(Si) 2.5 MeV electrons

(S)-GAIN IN DB(80uA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | 80.0 | 5.228 5.714 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 9.85X10⁻³

DEVICE TYPE: HM6508 CMOS 1Kx1 RAM

TEST DATE: 9-11-81

MFG: HAR 6 Devices

DATE CODE: 8029

REF: JPL LOG 0764

SOURCE: Co⁶⁰, 1.25 MeV γ

Six samples of the Harris HM6508 RAM, date code 8029, were radiation tested at BREL on 11 September 1981, per RTR-231A, Rev. 1. The radiation levels were 2, 6, 12, 20, and 30 krad(Si). The dose rate was 53 rad(Si)/second.

Four of the lot failed at 12 krad(Si). One of the devices, S/N 37, was prone to enter SCR latchup during some measurements and failed at 2 krad(Si).

Device serial number 38 remained functional to 20 krad(Si), even though its I_{CCL} and I_{CCH} had increased from 22.4 nA to 8.5 mA, and was latchup prone. There was little parameter shift on any device before failure except for I_{CCL} and I_{CCH} .

Individual I_{CCL} and I_{CCH} Measurements

| S/N | Initial, nA | 2 krad(Si), μ A | 6 krad(Si), mA | 12 krad(Si), mA | 20 krad(Si), mA |
|-----|----------------|---------------------|----------------|-----------------|-----------------|
| 36 | 21.4 | 383 | 17.6* | 45.9* | _____ |
| 37 | 21.2 | 1330* | 31.1* | 71.5* | _____ |
| 38 | 22.4 | 883 | 1.3* | 8.5* | <u>8.5*</u> |
| 39 | 31.7 | 391 | 0.14* | 11.7* | _____ |
| 40 | 21.8 | 19.5 | 8.1* | 32.8* | _____ |
| 41 | 21.3 | 86.3 | 11.5* | 41.8* | _____ |

*SCR latchup prone

DEVICE TYPE: HM6551 CMOS 256x4 RAM

TEST DATE: 10-6-81

MFG: HAR 6 Devices

DATE CODE: 8049

REF: JPL LOG 0786

SOURCE: Co⁶⁰, 1.25 MeV γ

Six samples of the Harris HM6551 (Flat pack) 256x4 RAM, date code 8049, were radiation tested at BREL on 6 October 1981. The devices were tested per RTR 217A. The radiation levels were 2, 4, 6, 8, 10, 12, 14, 16, and 18 krad(Si). The dose rate was 53 rad(Si)/second.

One device failed at 12 krad(Si). Three additional devices failed at 14 krad(Si) and one more at 16 krad(Si). The last device failed at 18 krad(Si).

Most measured parameters indicated little or no change. The parameters which had noticeable change are listed in the table below.

Worst Case Values, Selected Parameters

| Total Dose, krad(Si) @ 53 rad(Si)/second | | | | | | | | | |
|--|---------|---------|-------|-------|-------|-------|-------|-------|-------|
| Parameter | Unit | Initial | 2 | 4 | 6 | 8 | 10 | 12 | 14 |
| V _{TH} | V | 1.661 | 1.502 | 1.383 | 1.264 | 1.126 | 0.983 | Fail | Fail |
| Δ _{TW} | ns | -- | -2.0 | -4.0 | -6.0 | -7.0 | -7.0 | Fail | Fail |
| I _{CC} | μ A | .028 | 181.5 | 1885 | 4130 | 6220 | 8930 | 11550 | 14700 |

DEVICE TYPE: HS6551 CMOS 256x4 RAM

TEST DATE: 10-6-81

MFG: HAR 6 Devices

DATE CODE: 7909

REF: JPL LOG 0765

SOURCE: Co⁶⁰, 1.25 MeV γ

Six samples of the Harris HS6551 (Plastic dip package) 256x4 RAM, date code 7909, were radiation tested at BREL on 6 October 1981. The devices were tested per RTR 217A. The radiation levels were 2, 4, 6, 8, 10, 12, 14, 16, and 18 krad(Si). The dose rate was 53 rad(Si)/second.

One device failed at 10 krad(Si). Two additional devices failed at 12 krad(Si) and two more at 16 krad(Si). The last device failed at 18 krad(Si).

Most measured parameters indicated little or no change. The parameters which had noticeable change are listed in the table below.

Worst Case Values, Selected Parameters

| Total Dose, krad(Si) @ 53 rad(Si)/second | | | | | | | | |
|--|-------|---------|------|------|------|------|------|------|
| Parameter | Units | Initial | 2 | 4 | 6 | 8 | 10 | 12 |
| V _{TH} | V | 1.46 | 1.33 | 1.31 | 1.23 | 1.10 | Fail | Fail |
| Δ _{TW} | ns | -- | 3 | 5 | 8 | 11 | 14 | Fail |
| I _{CC} * | mA | 11.9 | 12.7 | 13.3 | 14.7 | 14.3 | 22.3 | 29.1 |

*Note: There is some question of the validity of the power supply current (I_{CC}) measurement as the values seem unreasonably high.

DEVICE TYPE: HS6551-RH* CMOS 256x4 RAM

TEST DATE: 10-6-81

MFG: HAR 6 Devices

DATE CODE: 8119B

REF: JPL LOG 0787

SOURCE: Co⁶⁰, 1.25 MeV γ

Six samples of the Harris HS6551-RH (Dip package) 256 x 4 RAM, date code 8119B, were radiation tested at BREL on 6 October 1981. The devices were tested per RTR 217B. The radiation levels were 10, 20, 30, 40, 60, 80, 100, 120, and 140 krad(Si). The dose rate was 53 rad(Si)/second.

One device failed at 100 krad(Si). Two additional devices failed at 120 krad(Si) and the last three failed at 140 krad(Si).

Most measured parameters indicated little or no change. The parameters which had noticeable change are listed in the table below.

Worst Case Values, Selected Parameters

| Total Dose, krad(Si) @ 53 rad(Si)/second | | | | | | | | | | |
|--|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| Parameter | Units | Initial | 10 | 20 | 30 | 40 | 60 | 80 | 100 | 120 |
| V _{TH} | V | 2.04 | 1.86 | 1.69 | 1.54 | 1.41 | 1.27 | 0.924 | Fail | Fail |
| Δ_{TW} | ns | -- | -13 | -20 | -24 | -26 | -29 | -30 | Fail | Fail |
| I _{OH} | mA | -3.14 | -3.07 | -2.97 | -2.89 | -2.83 | -2.69 | -2.55 | -2.50 | -2.32 |
| I _{CC**} | mA | 5.81 | 6.07 | 7.37 | 13.0 | 17.6 | 25.3 | 25.8 | 34.9 | 41.2 |

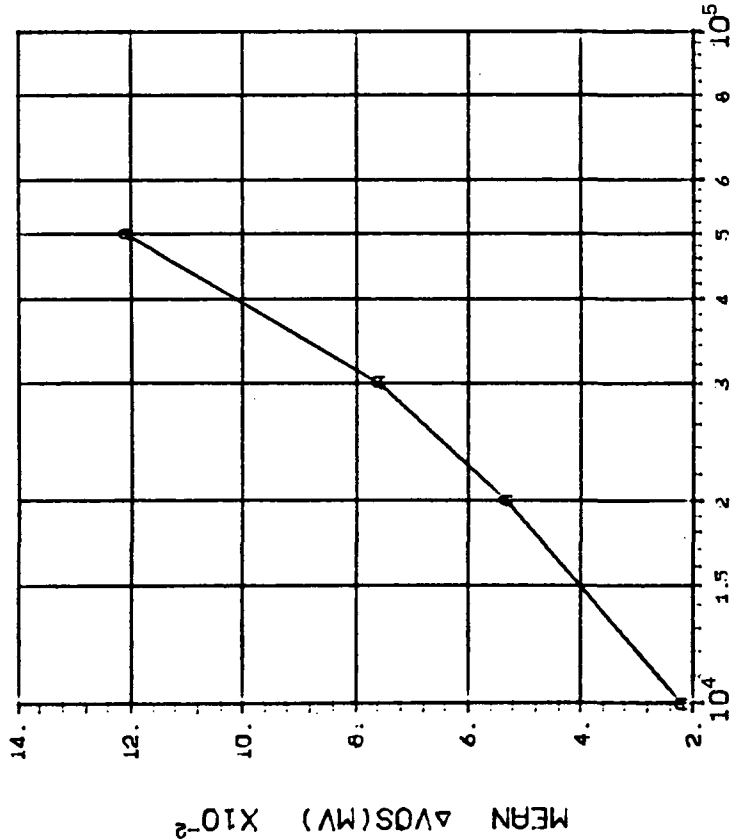
*Radiation Hardened Process

**Note: There is some question of the validity of the power supply current (I_{CC}) measurement as the values seem unreasonably high.

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0901-1 DATE CODE 8218

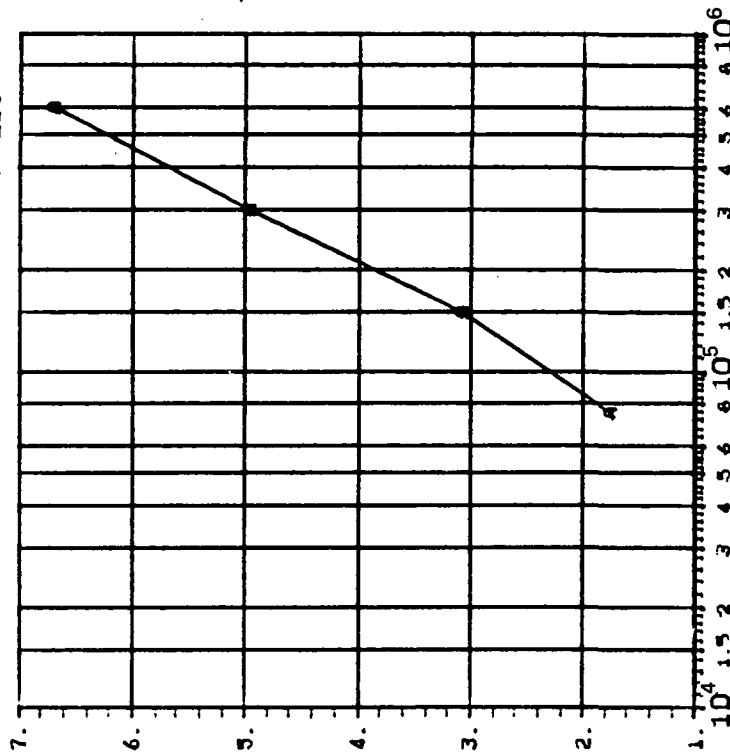


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 20 30 50 |
| | .0113 .0209 .0267 .0353 |

DEVICE TYPE: L144 LOW POWER OP AMP

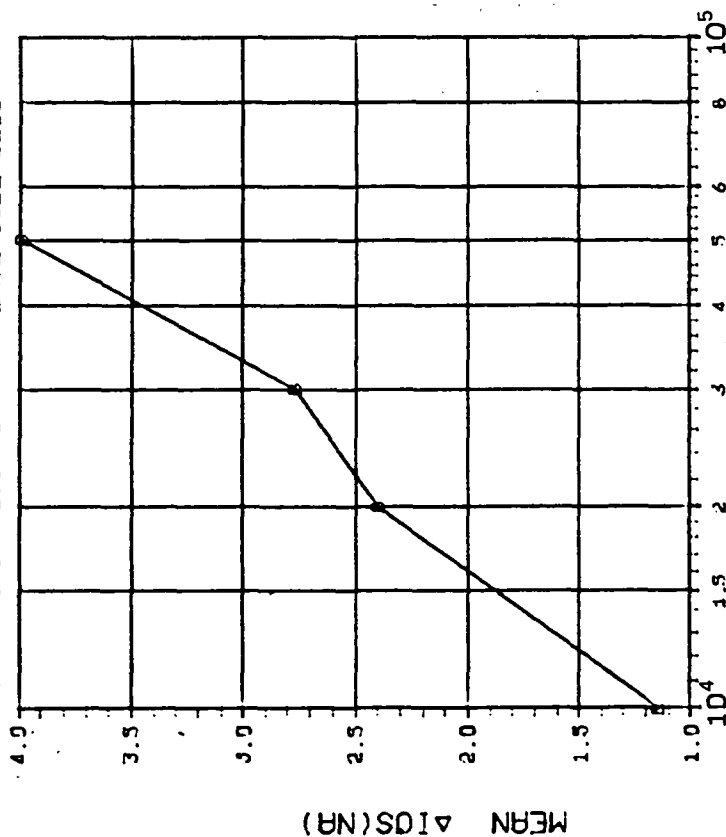
MFG: SIL 6 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0901-2 DATE CODE 8218



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 600 |
| | .0492 .0738 .1167 .1701 |

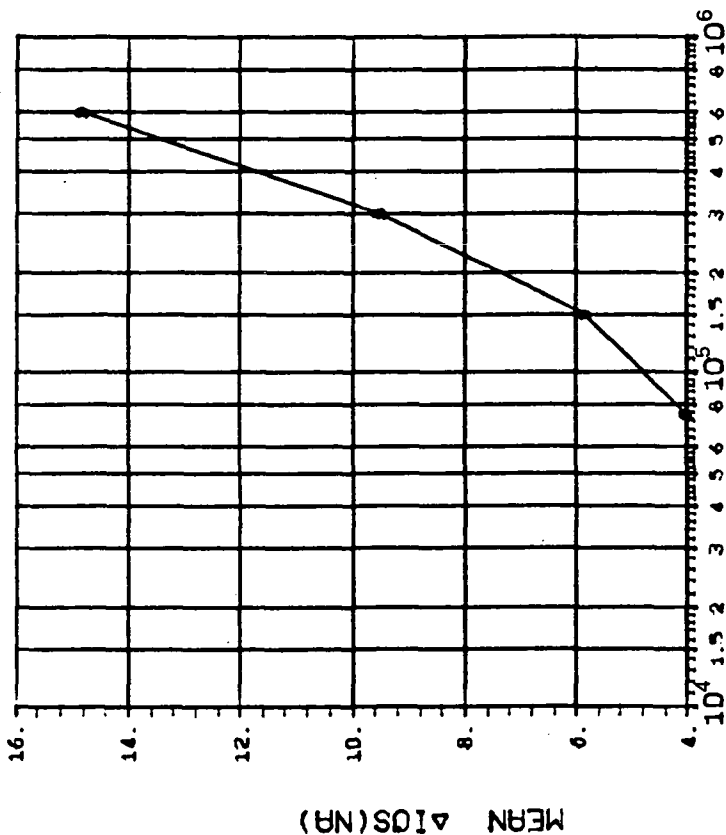
DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 7-28-83
 REF: JPL LOG 0901-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons
 (2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| B | 50 |
| | 100 |
| | 1000 |

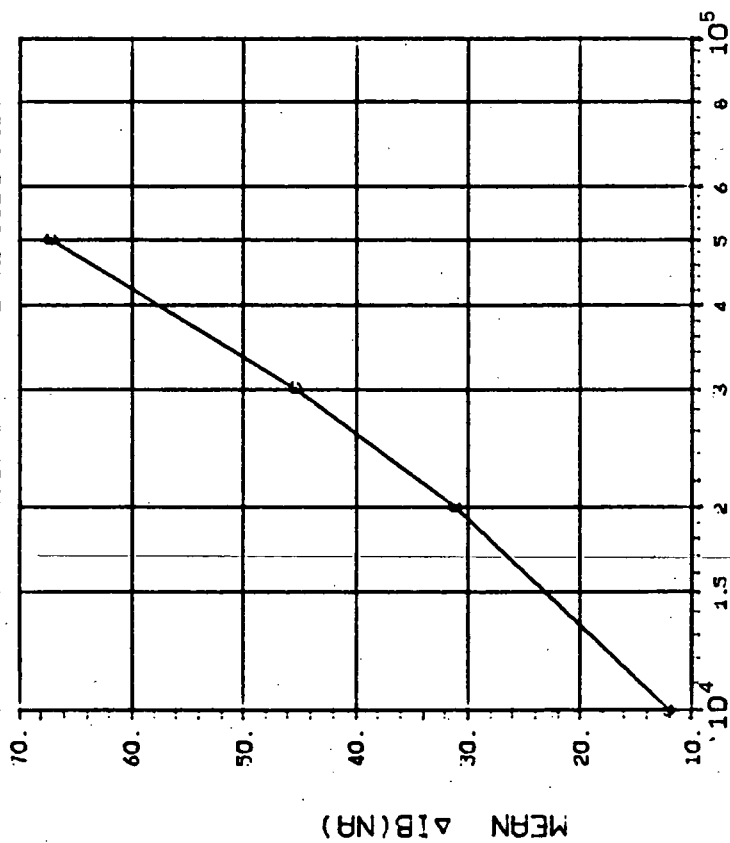
DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 7-28-83
 REF: JPL LOG 0901-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons
 (2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| B | 600 |
| | 1000 |
| | 10000 |

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 7-28-83
REF: JPL LOG 0901-1 DATE CODE 8218

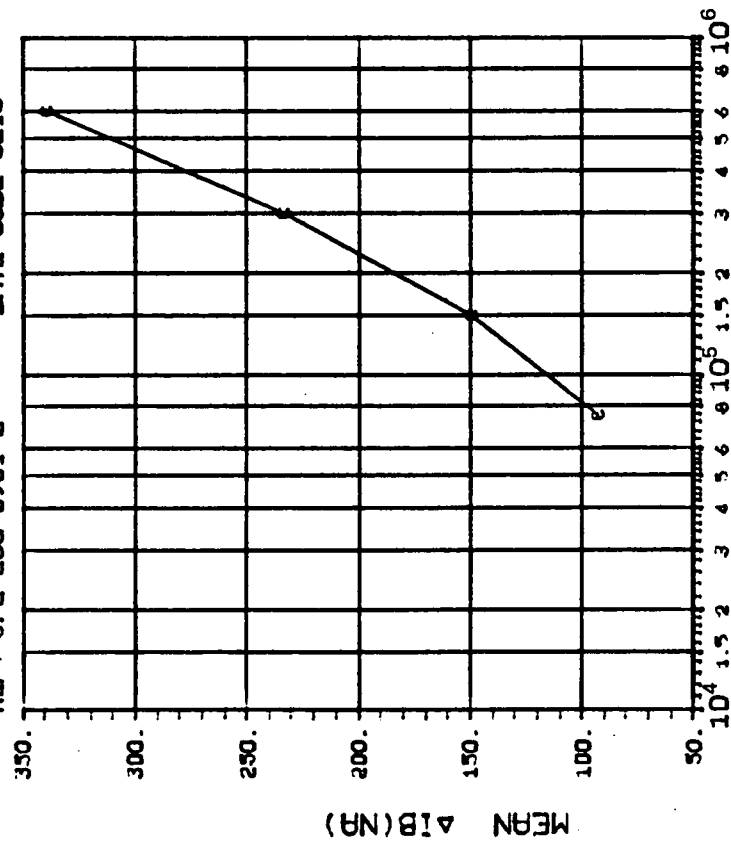


DOSE, rads(Si) 2.5 MeV electrons

(3) $\Delta IB(NA)$ VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | .10 .20 .30 .50 |
| | 15.74 24.96 32.81 39.53 |

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 7-28-83
REF: JPL LOG 0901-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

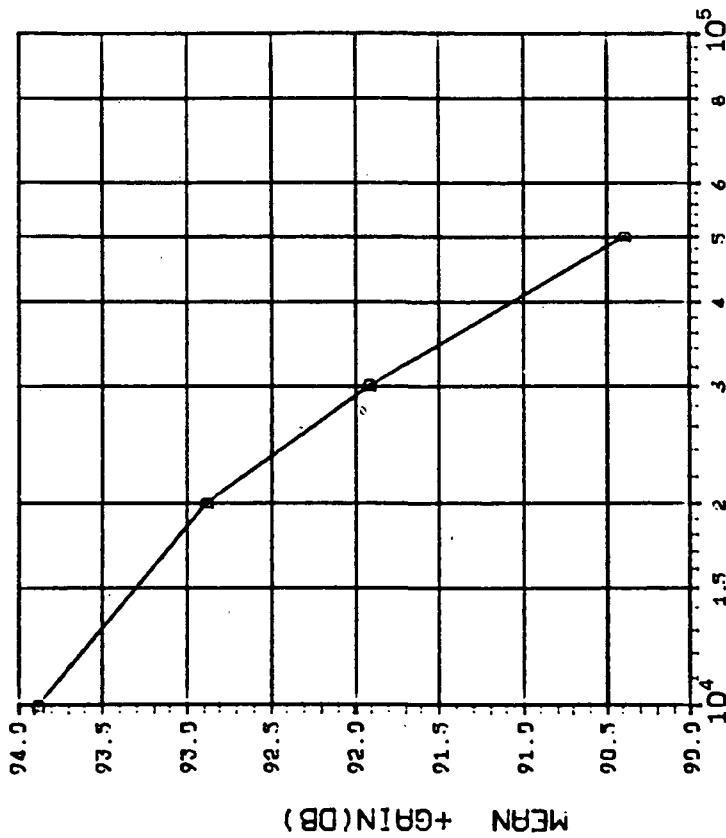
(3) $\Delta IB(NA)$ VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 150 300 600 |
| | 47.86 66.62 67.65 65.02 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0901-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

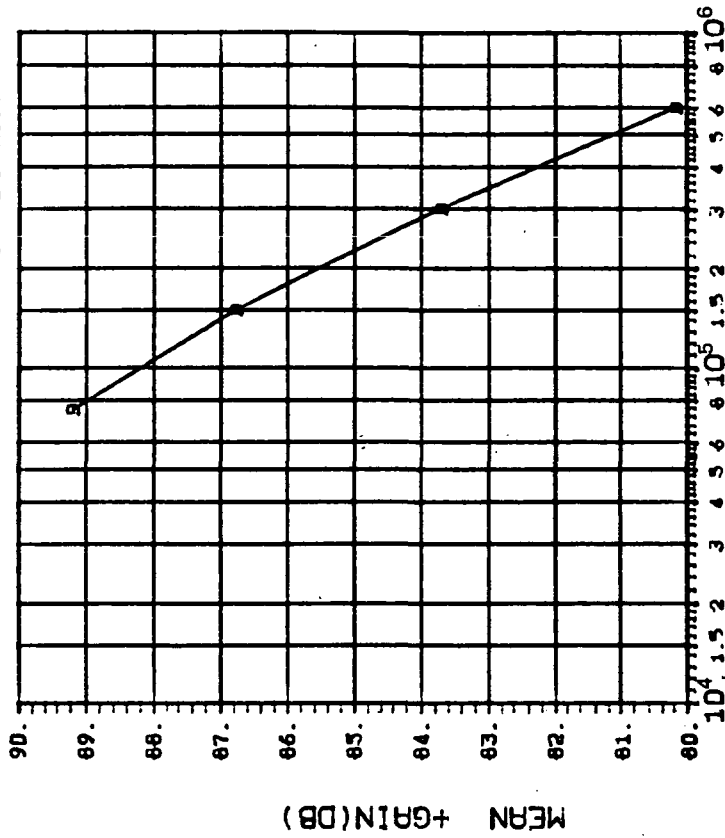
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | .10 .20 .30 .50 |
| | | .9810 1.047 .9544 .7595 |

INITIAL MEAN VALUE +GAIN(DB) = 9.53X10⁻¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0901-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

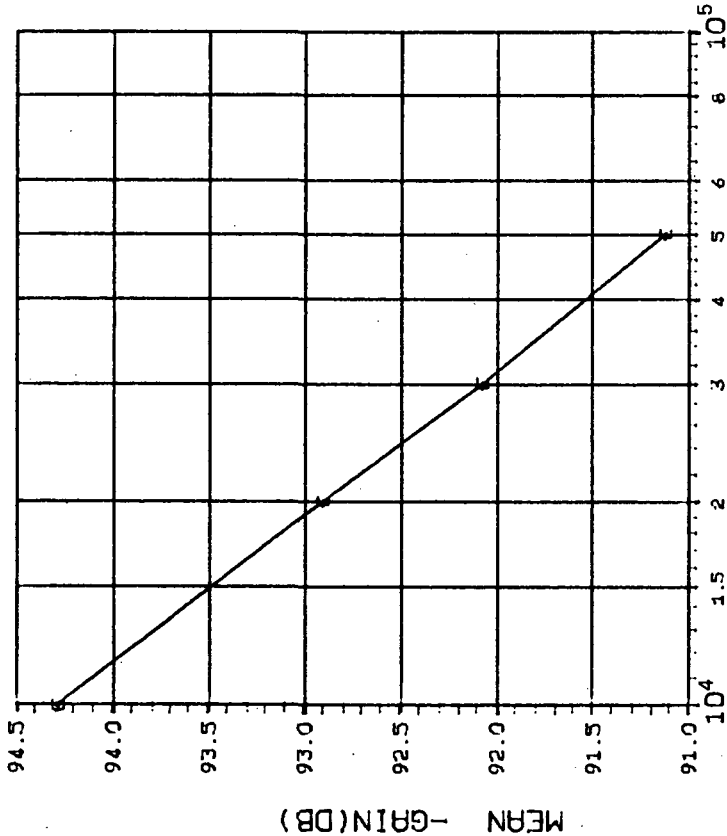
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | .75 150 300 600 |
| | | .6136 .6102 .6221 .4561 |

INITIAL MEAN VALUE +GAIN(DB) = 9.53X10⁻¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0901-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

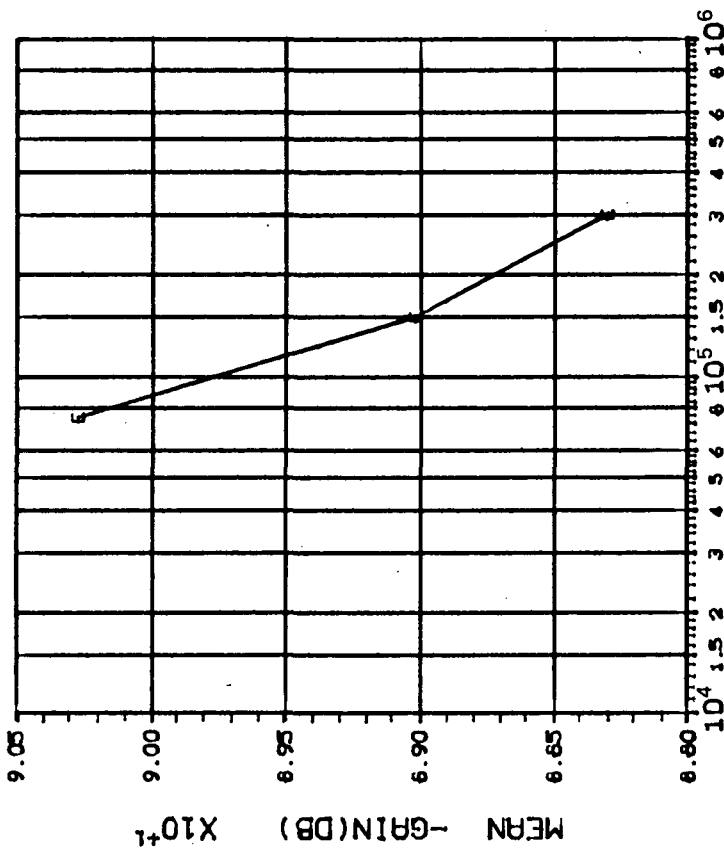
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 10 20 30 50 |
| | | .5443 .5676 .6041 .6536 |

INITIAL MEAN VALUE -GAIN(DB) = 9.56X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-28-83

REF: JPL LOG 0901-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

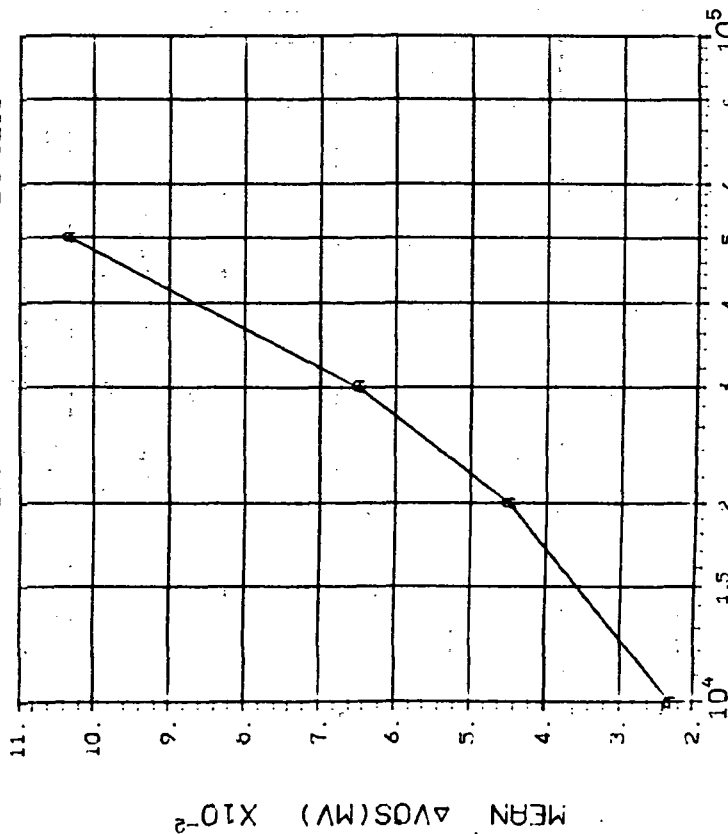
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 75 150 300 600 |
| | | .4600 .7176 .4790 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 9.56X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0902-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

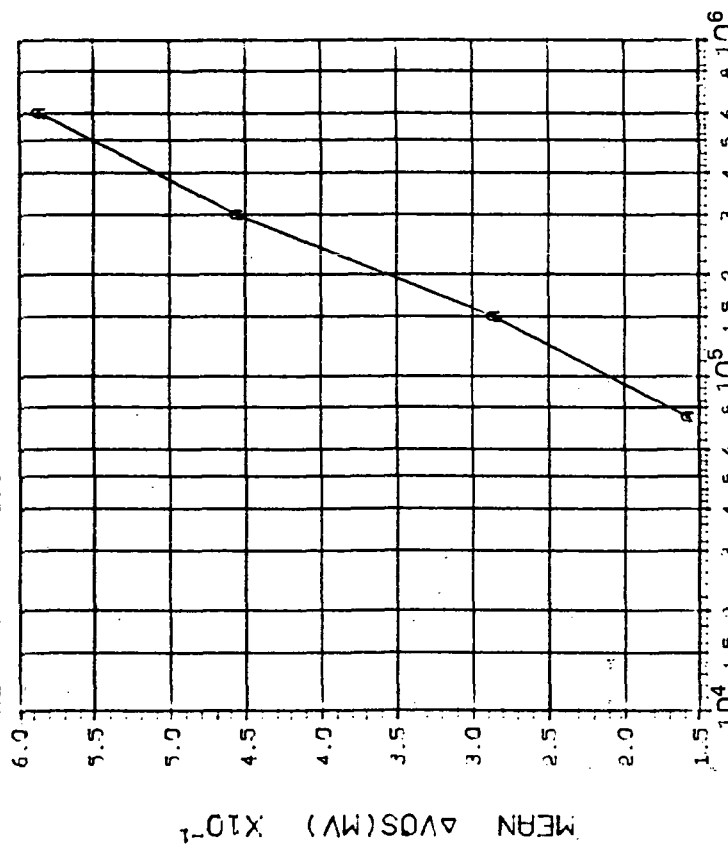
(1)ΔVOS(MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 |
| | 20 |
| | 30 |
| | 50 |
| | .0250 .0243 .0302 .0207 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0902-2 DATE CODE 8218

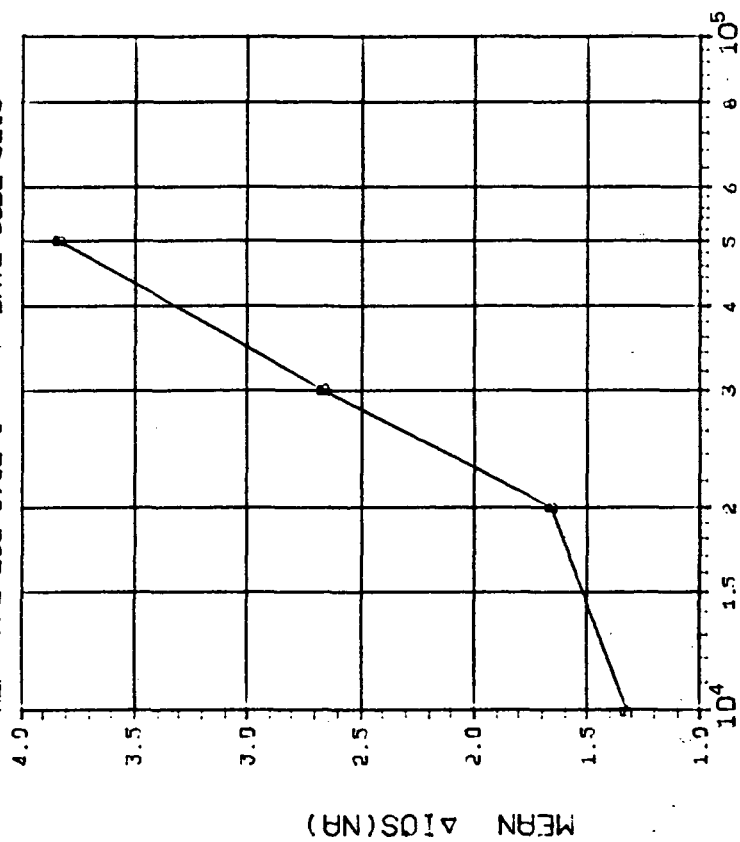


DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV) VS DOSE

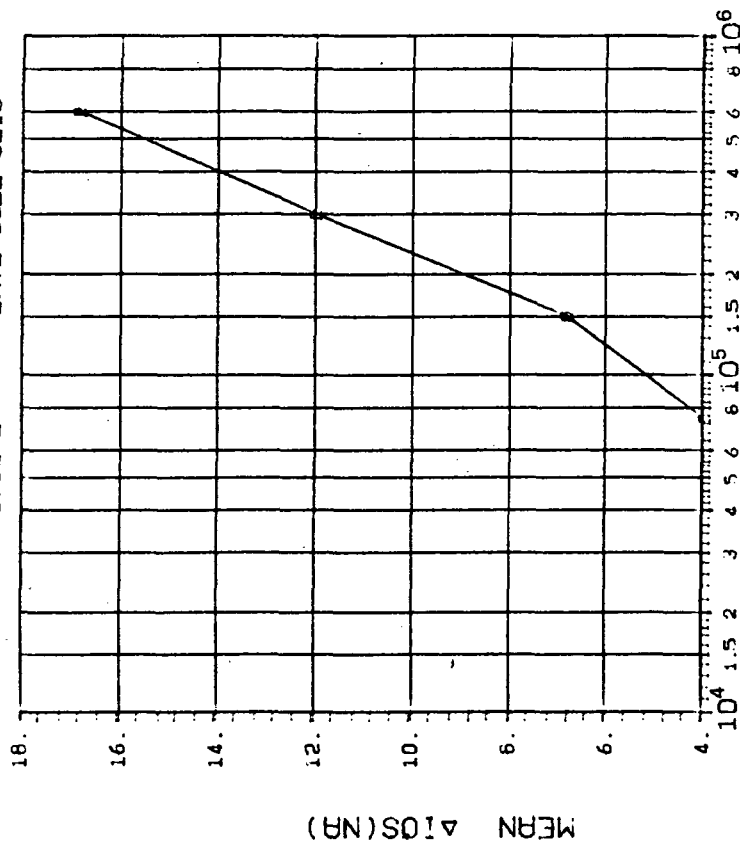
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| | .0334 .0468 .0831 .1412 |

DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 7-29-83
 REF: JPL LOG 0902-1 DATE CODE 8218



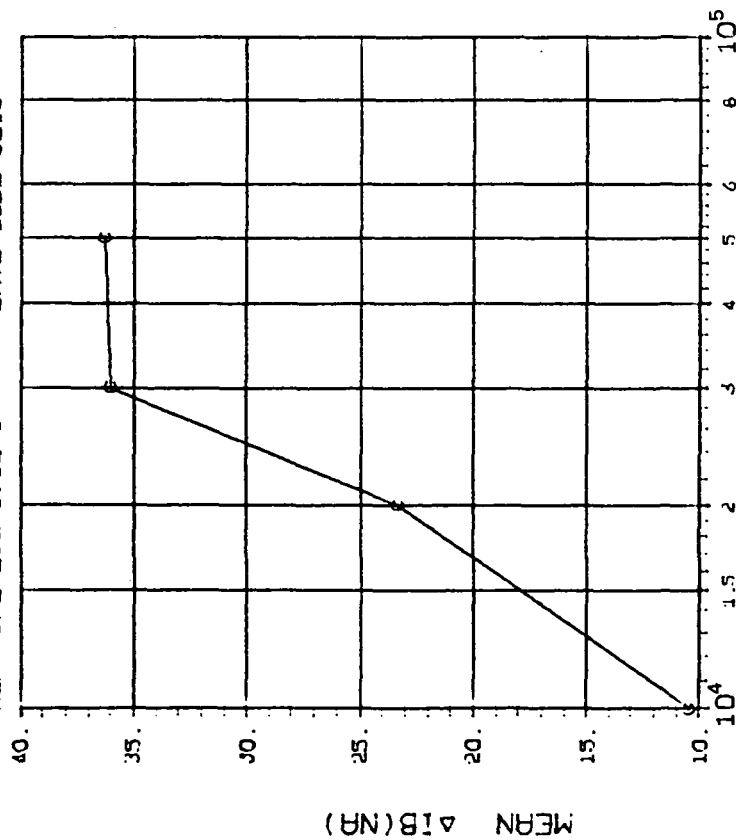
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| 1.033 1.033 1.033 1.169 | |

DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 7-29-83
 REF: JPL LOG 0902-2 DATE CODE 8218



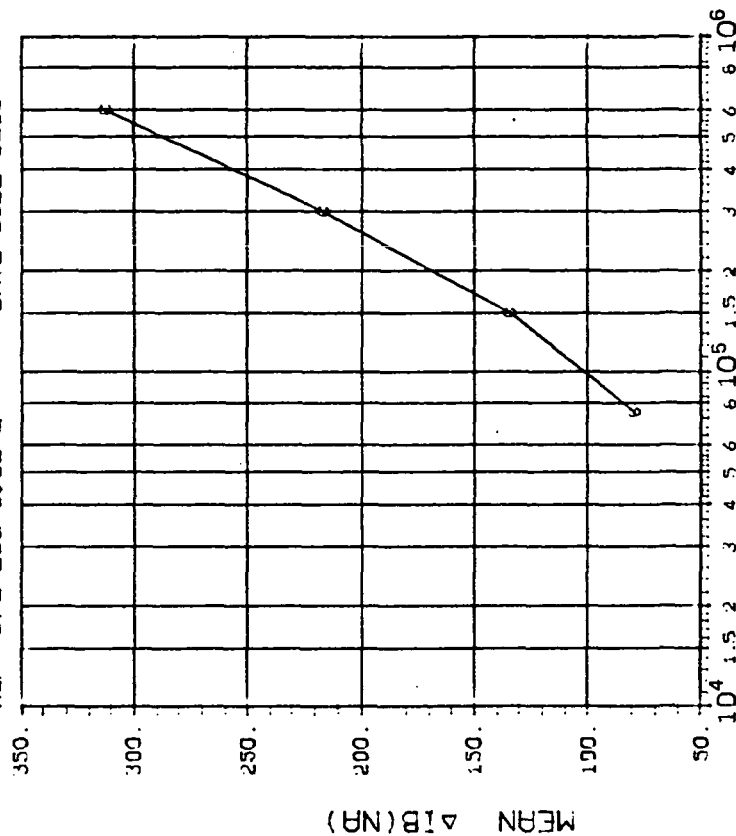
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| 1.414 2.858 3.847 6.178 | |

DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 7-29-83
 REF: JPL LOG 0902-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons
 (3)ΔIB (NA) VS DOSE

DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 7-29-83
 REF: JPL LOG 0902-2 DATE CODE 8218

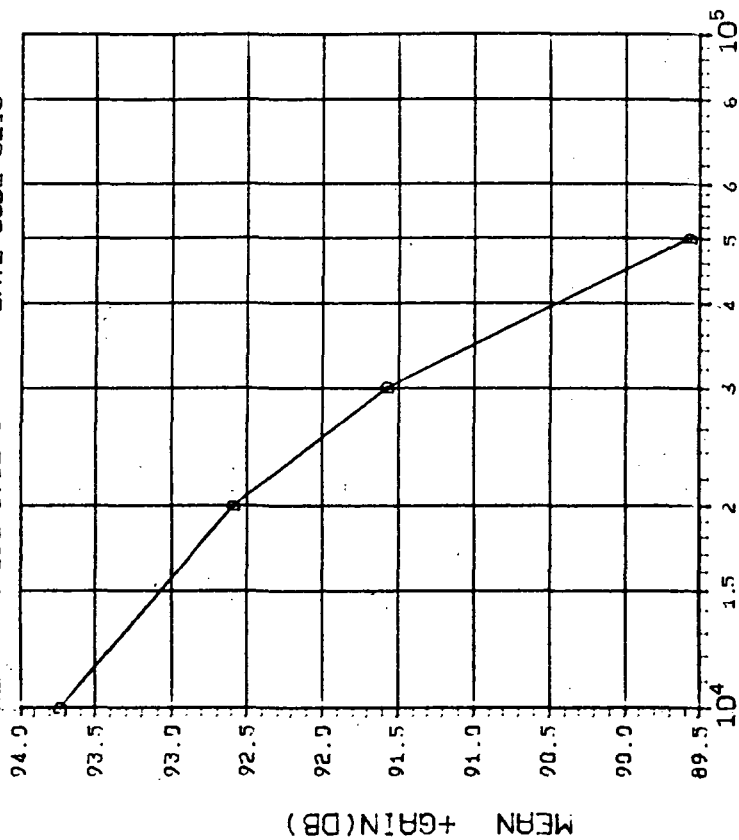


DOSE, rads(Si) 2.5 MeV electrons
 (3)ΔIB (NA) VS DOSE

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SJL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0902-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

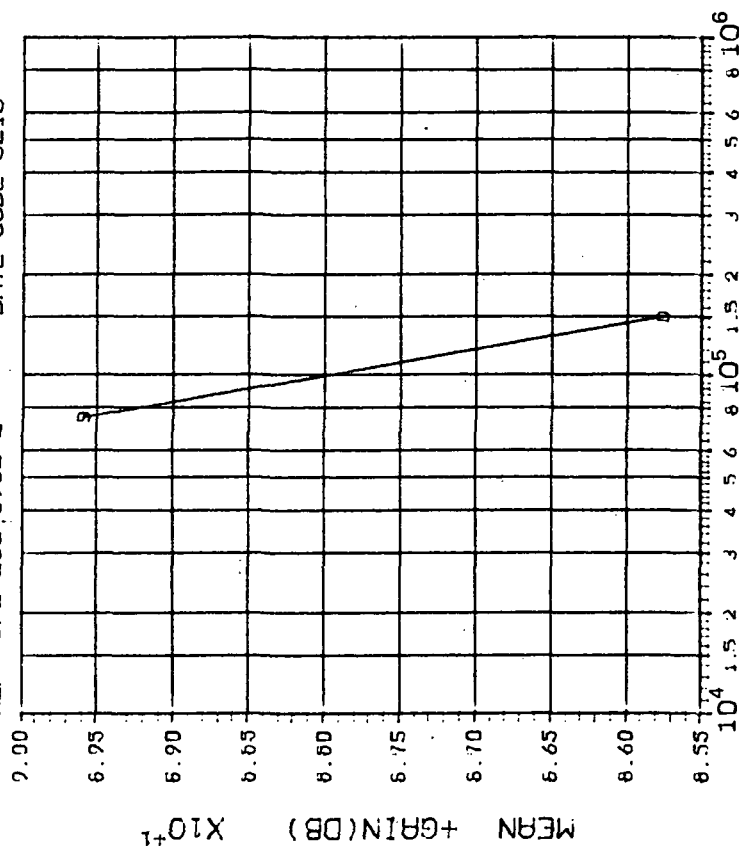
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 1.665 2.173 1.261 |

INITIAL MEAN VALUE +GAIN(DB) = 9.44X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SJL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0902-2 DATE CODE 8218



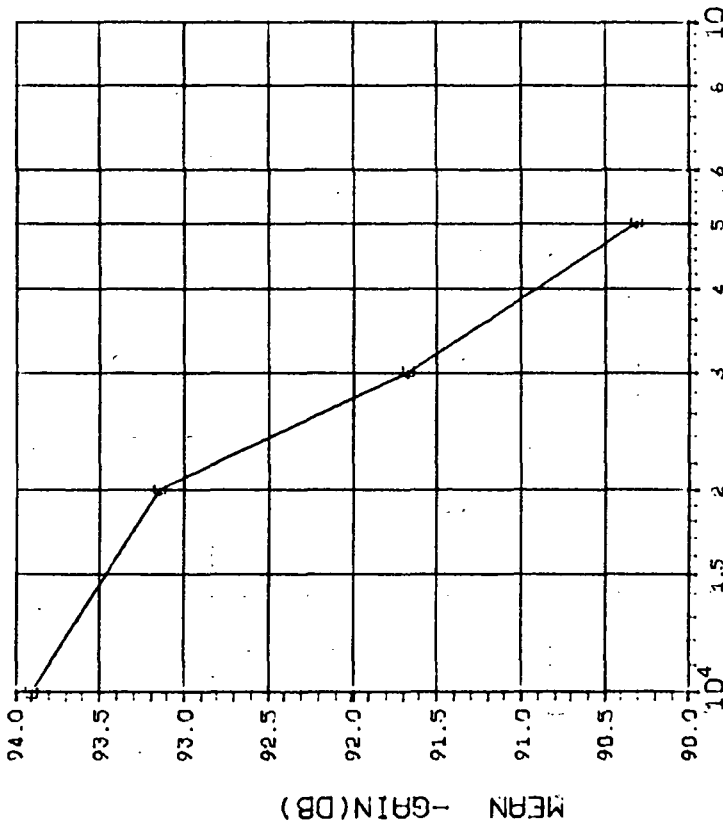
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 1.036 1.561 ***** |

INITIAL MEAN VALUE +GAIN(DB) = 9.44X10⁺¹

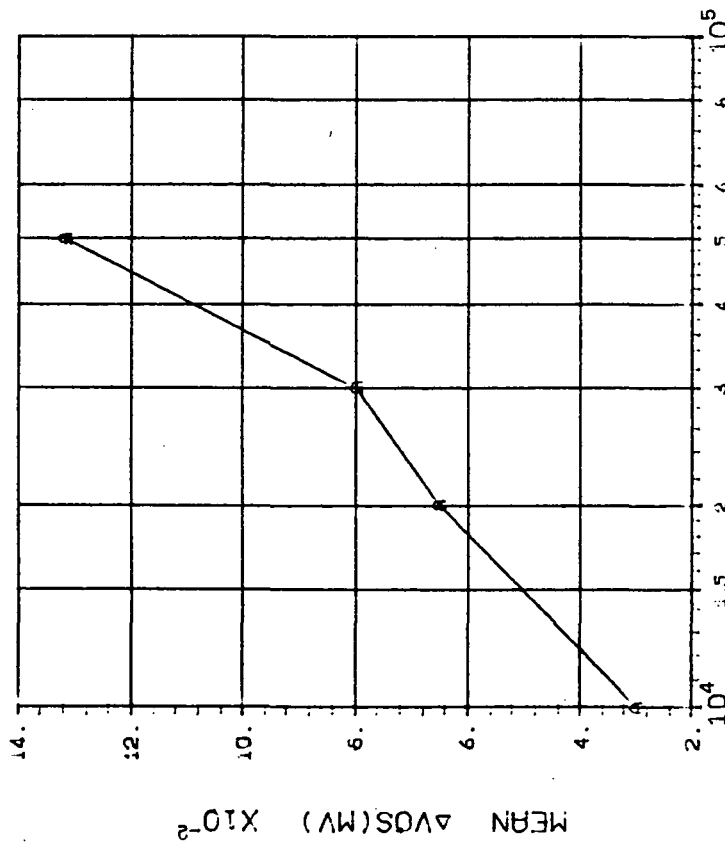
DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 7-29-83
 REF: JPL LOG 0902-1 DATE CODE 8218



| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 10 20 30 50 |
| | | .7911 1.088 1.119 .9811 |

INITIAL MEAN VALUE -GAIN(DB) = $9.52 \times 10^{+1}$

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 7-29-83
REF: JPL LOG 0903-1 DATE CODE 8216

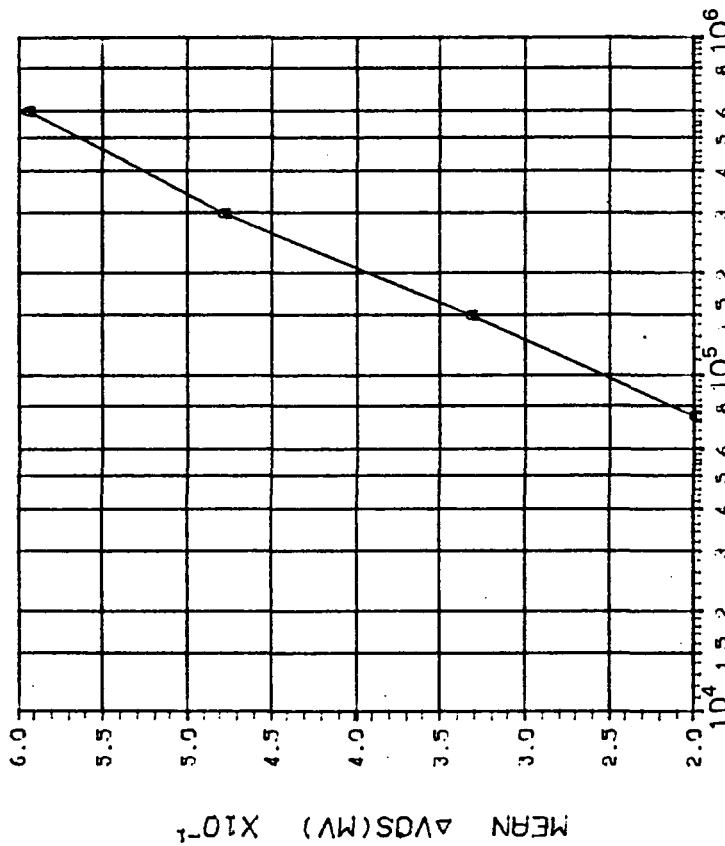


DOSE, rads(Si) 2.5 MeV electrons

(1) ΔV_{OS} (MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0126 | .0345 .0352 .0483 |

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 7-29-83
REF: JPL LOG 0903-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

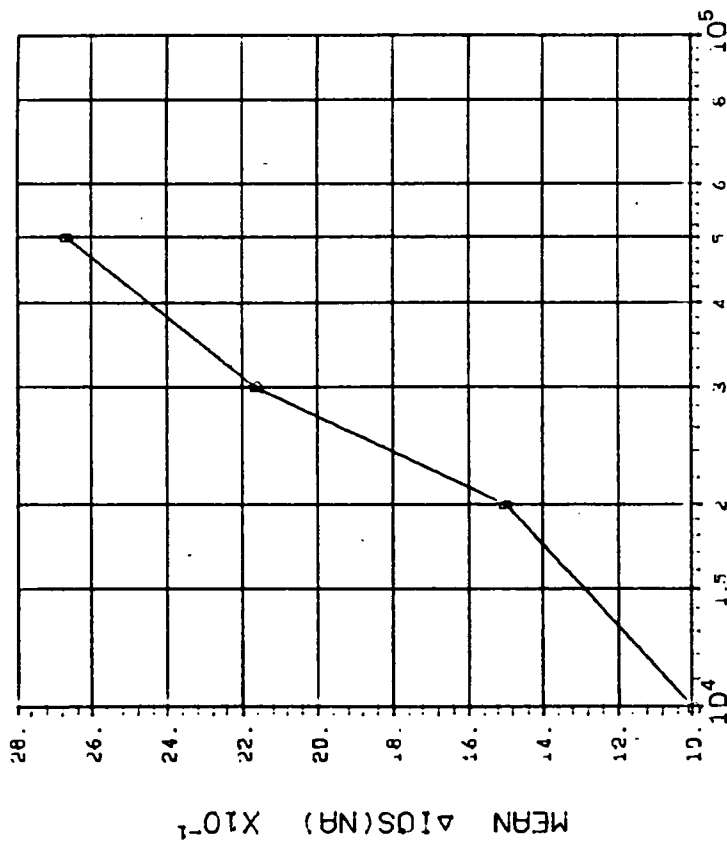
(1) ΔV_{OS} (MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .0681 | .0799 .0924 .1166 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-1 DATE CODE 8218

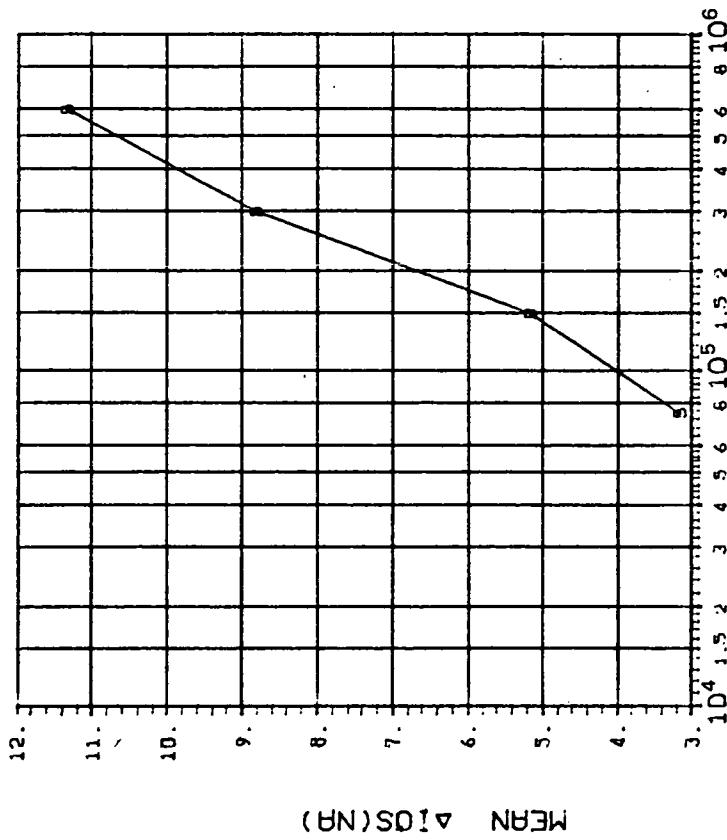


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| | 50 |
| | 60 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-2 DATE CODE 8218

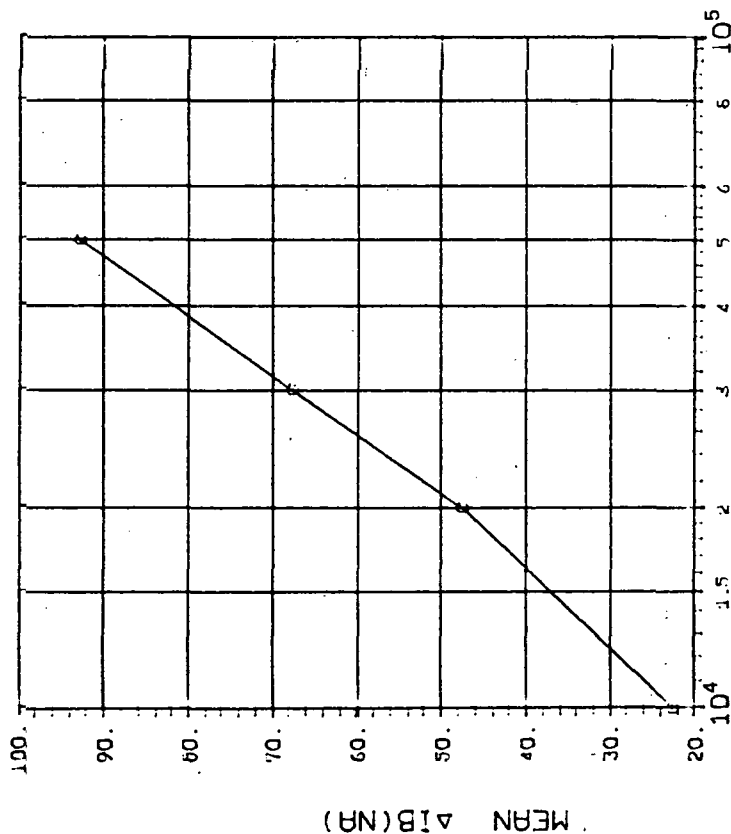


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 750 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA) VS DOSE

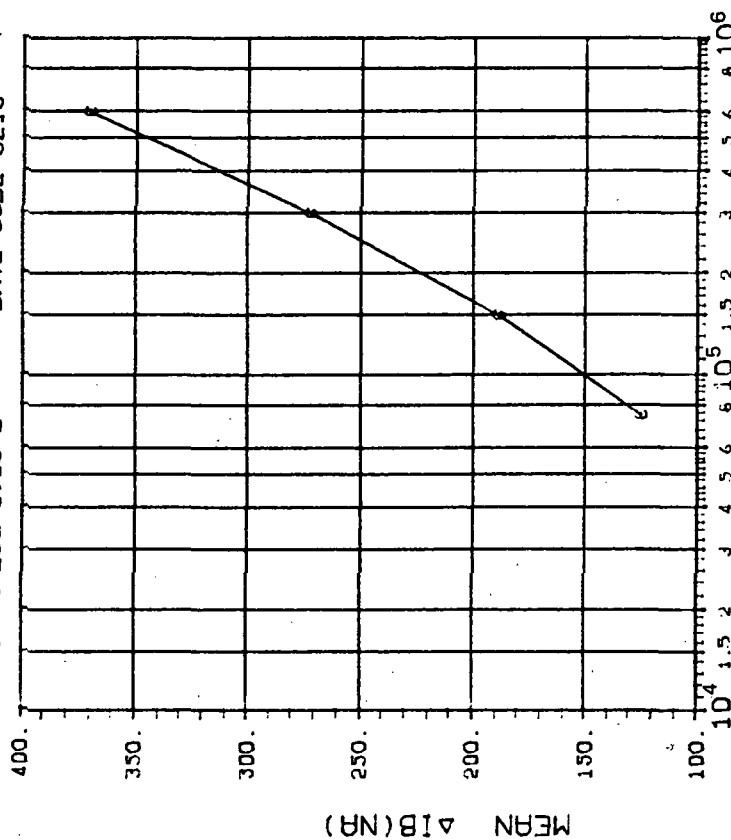
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| 1 | 10 20 30 50 |
| | 16.06 27.77 30.02 31.29 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA) VS DOSE

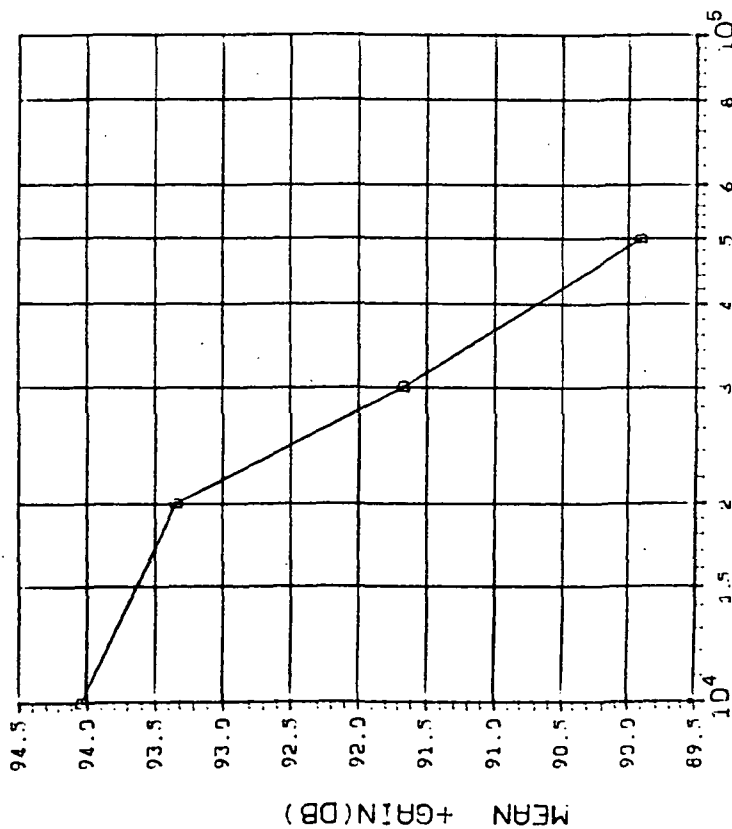
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| 1 | 75 150 300 600 |
| | 34.25 36.28 43.39 46.68 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

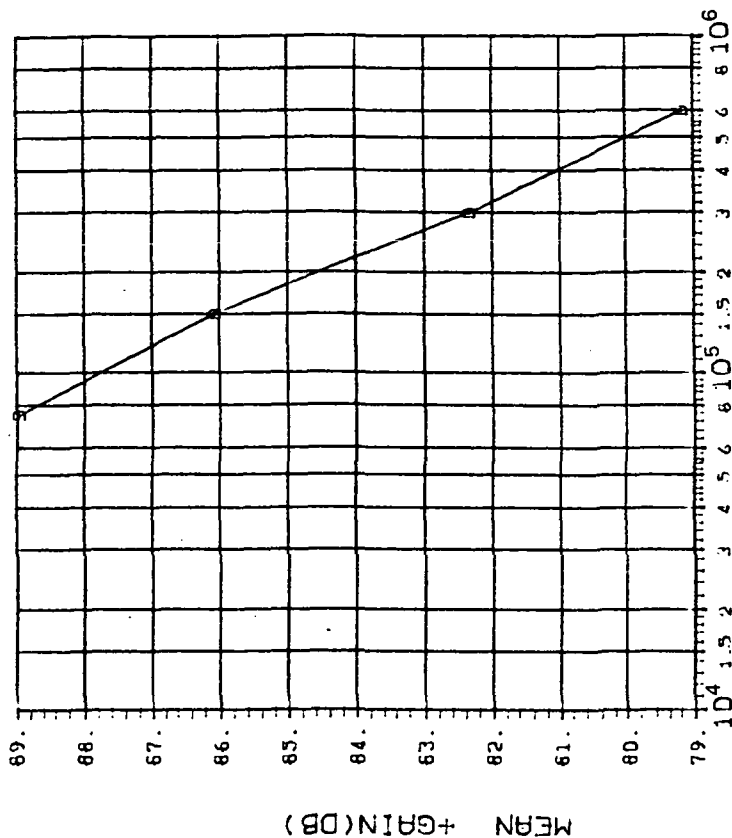
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 10 20 30 50 |
| | | 1.059 1.525 1.638 1.660 |

INITIAL MEAN VALUE +GAIN(DB) = 9.50X10⁴

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN(DB) VS DOSE

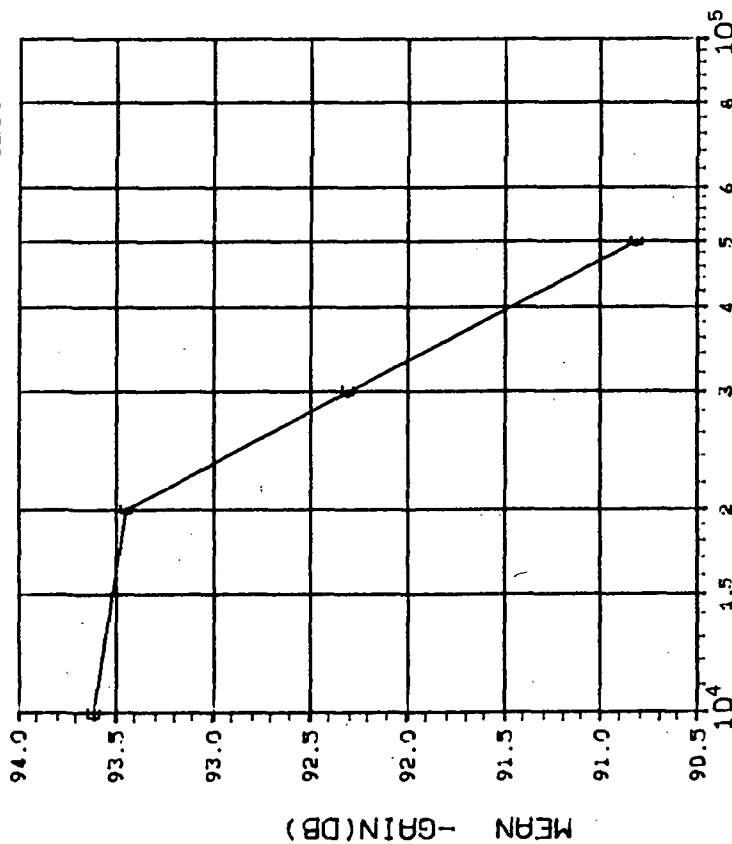
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 75 150 300 600 |
| | | .9296 1.590 1.4704 .7085 |

INITIAL MEAN VALUE +GAIN(DB) = 9.50X10⁴

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

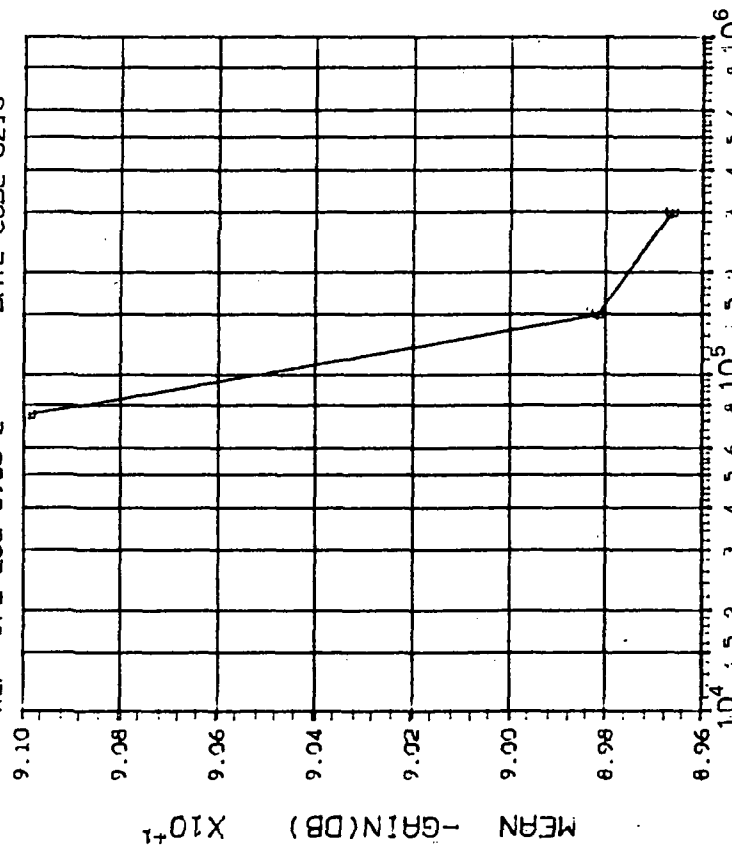
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 10 20 30 50 |
| E | **** | 1.591 .7649 1.337 1.151 |

INITIAL MEAN VALUE -GAIN(DB) = 9.59X10⁴¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 7-29-83

REF: JPL LOG 0903-2 DATE CODE 8218



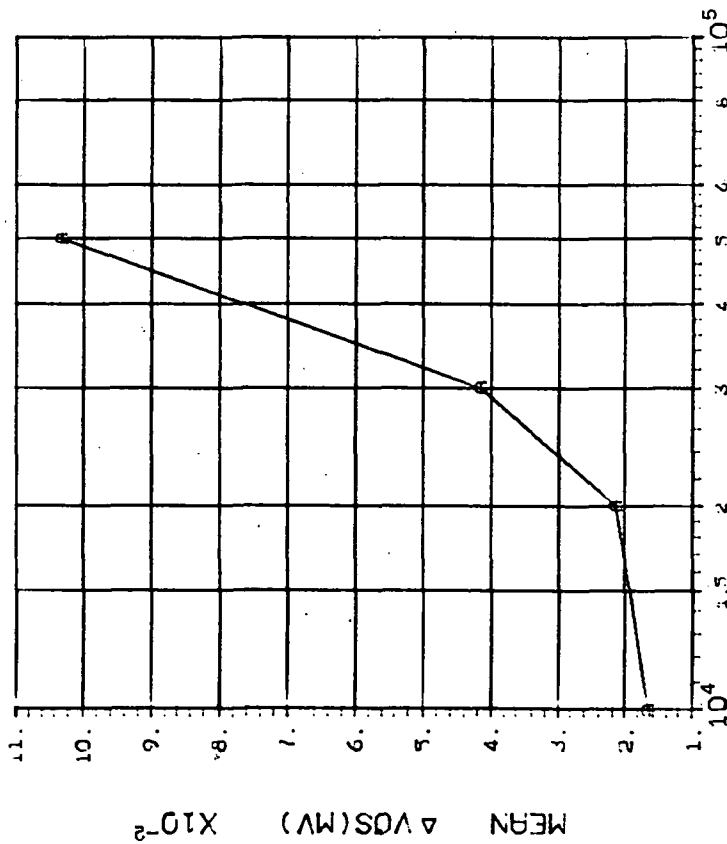
DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 75 150 300 600 |
| E | **** | .8178 1.037 1.614 **** |

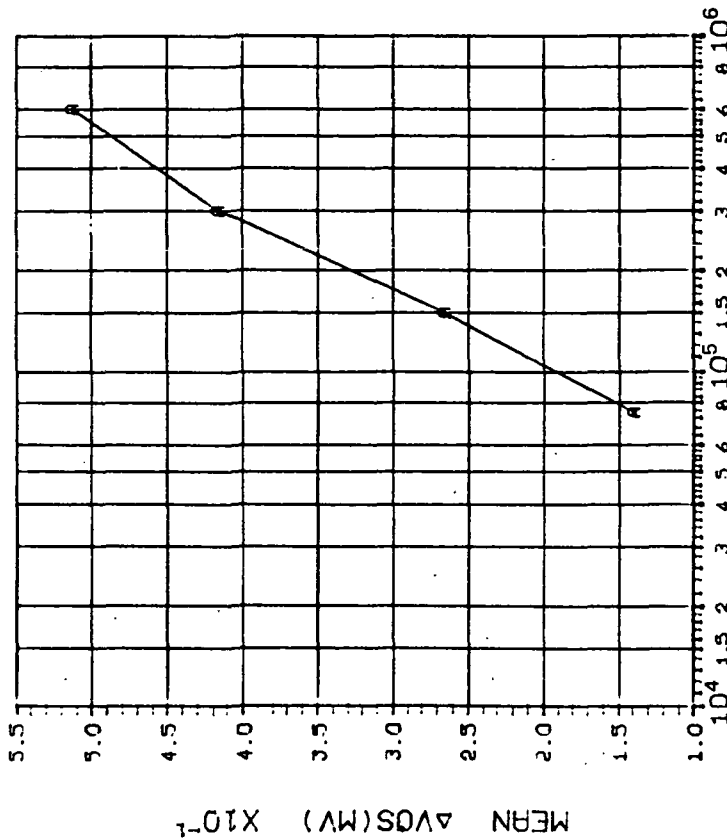
INITIAL MEAN VALUE -GAIN(DB) = 9.59X10⁴¹

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 8-1-83
REF: JPL LOG 0904-1 DATE CODE 8218



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 |
| | 20 |
| | 30 |
| | 50 |
| A | .0137 |
| | .0160 |
| | .0271 |
| | .0794 |

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 8-1-83
REF: JPL LOG 0904-2 DATE CODE 8218

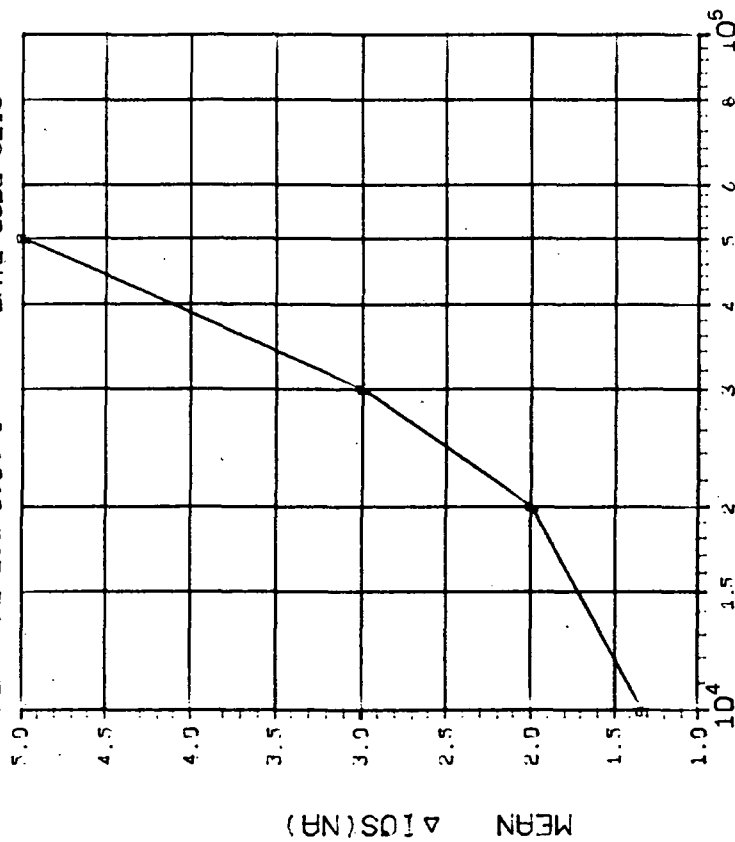


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| A | .0537 |
| | .0659 |
| | .1044 |
| | .1253 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-1-83

REF: JPL LOG 0904-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

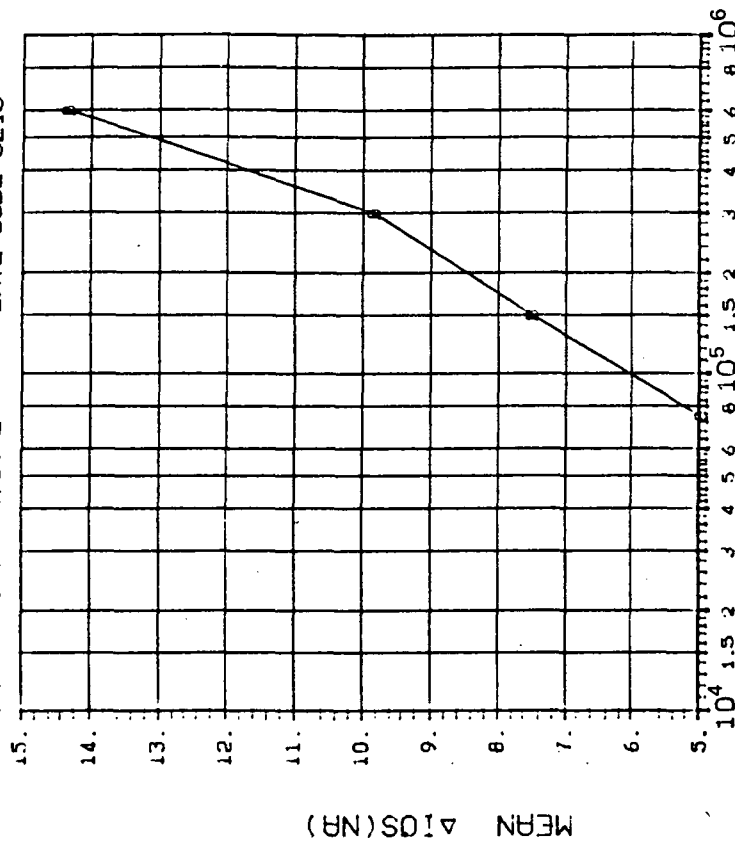
(2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | 1.033 | 1.769 1.673 2.628 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-1-83

REF: JPL LOG 0904-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

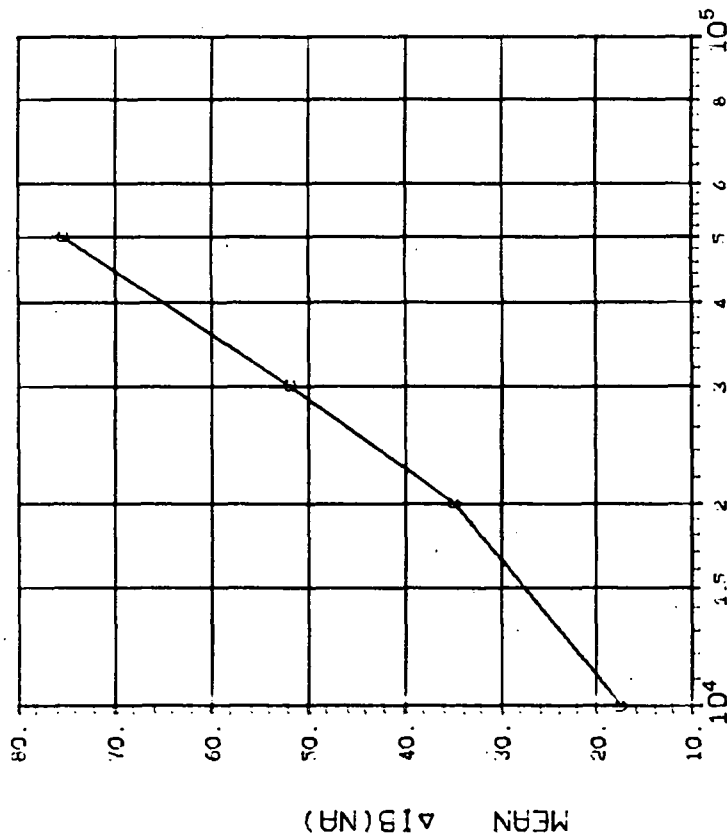
(2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| B | 3.286 | 4.087 5.776 7.230 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-1-83

REF: JPL LOG 0904-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

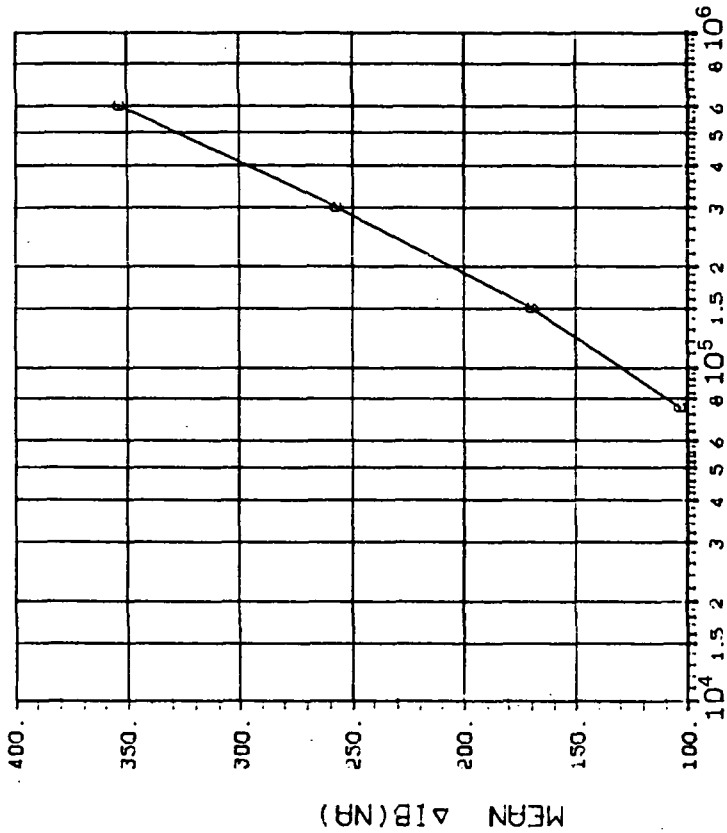
(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 20 30 50 |
| | 20.50 35.38 43.01 50.63 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-1-83

REF: JPL LOG 0904-2 DATE CODE 8218

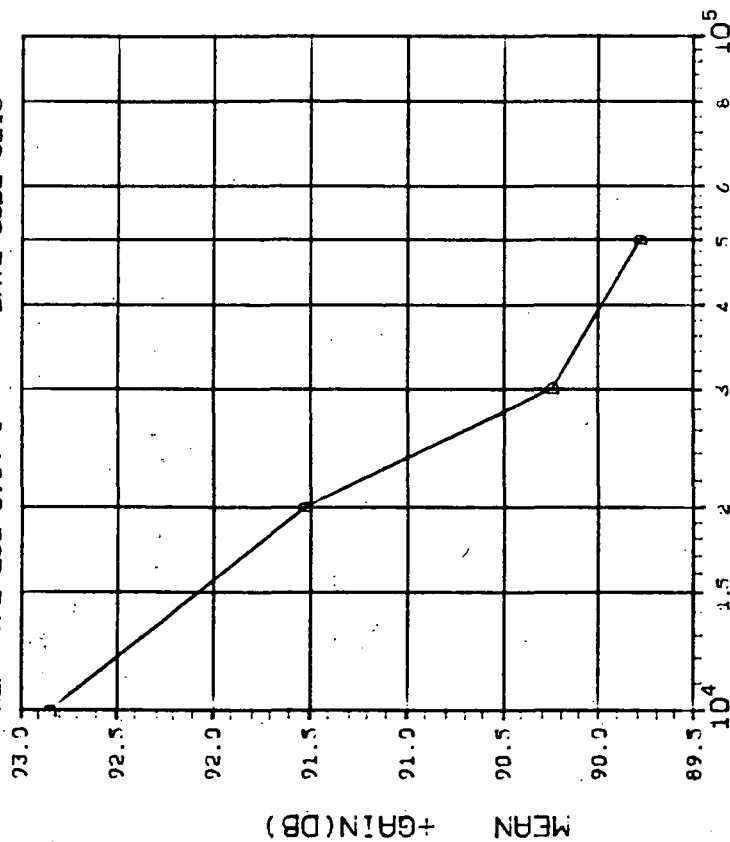


DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 150 300 600 |
| | 58.60 64.55 70.98 78.75 |

DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 8-1-83
 REF: JPL LOG 0904-1 DATE CODE 8218

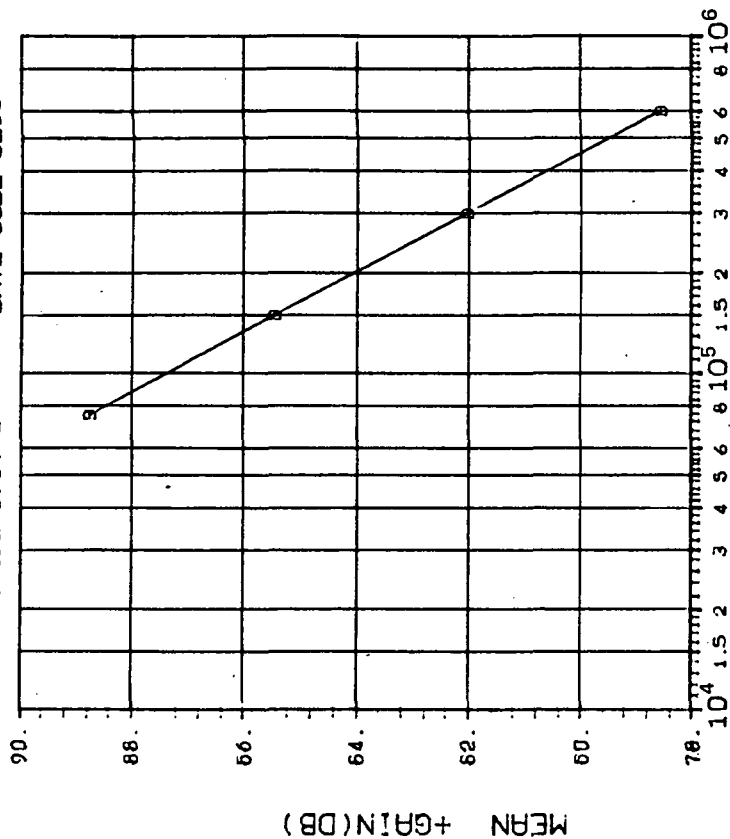


DOSE, rads(Si) 2.5 MeV electrons
 (4)+GAIN(DB) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | .5733 .7844 .6610 .7334 |

INITIAL MEAN VALUE +GAIN(DB) = 9.40X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 8-1-83
 REF: JPL LOG 0904-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons
 (4)+GAIN(DB) VS DOSE

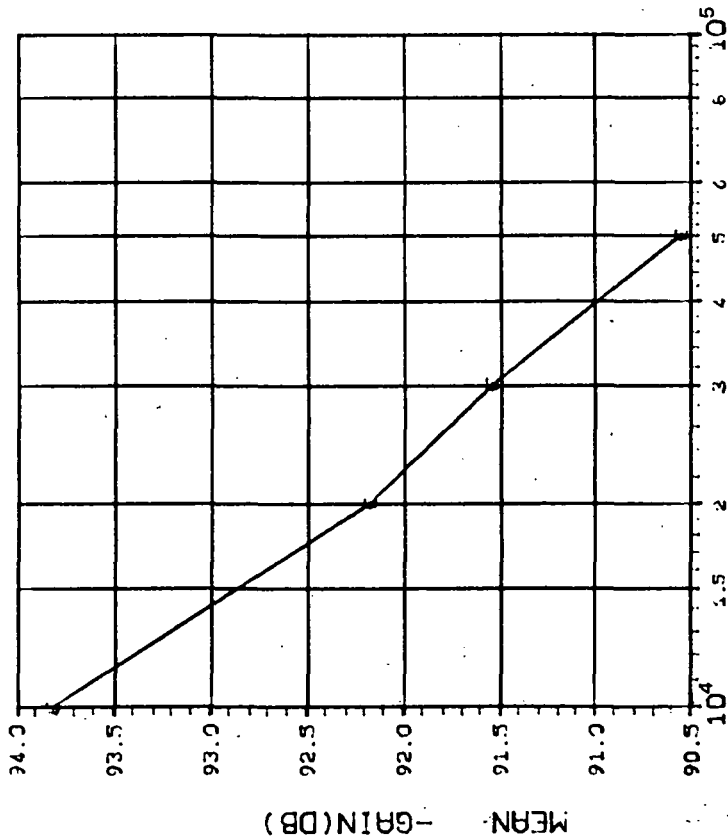
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | .1.679 .6275 .2289 4.681 |

INITIAL MEAN VALUE +GAIN(DB) = 9.40X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SJL 6 DEVICES TEST DATE 8-1-83

REF: JPL LOG 0904-1 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

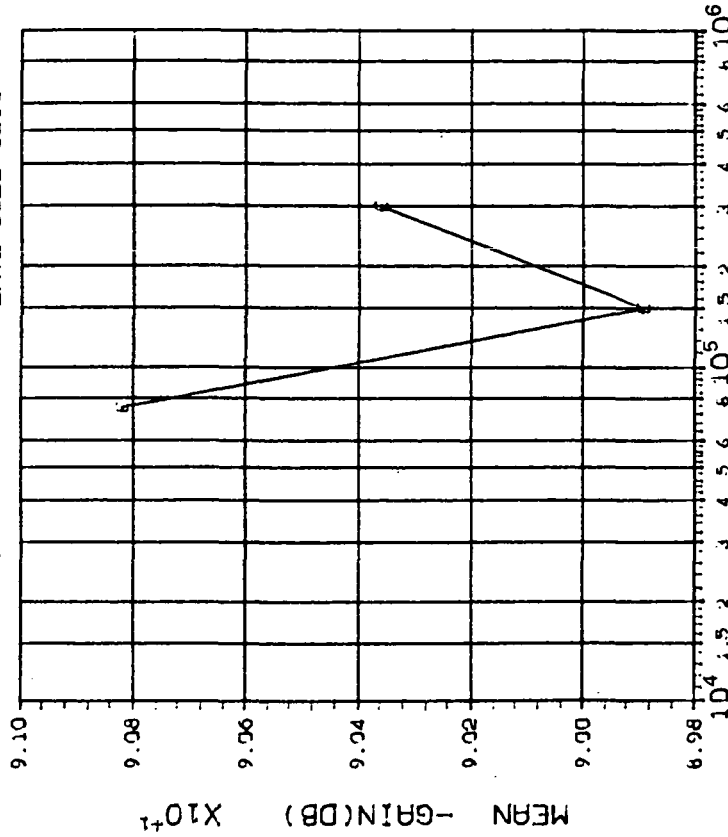
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | *** | .9210 1.224 .4049 1.402 |

INITIAL MEAN VALUE -GAIN(DB) = 9.52X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SJL 6 DEVICES TEST DATE 8-1-83

REF: JPL LOG 0904-2 DATE CODE 8218



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN(DB) VS DOSE

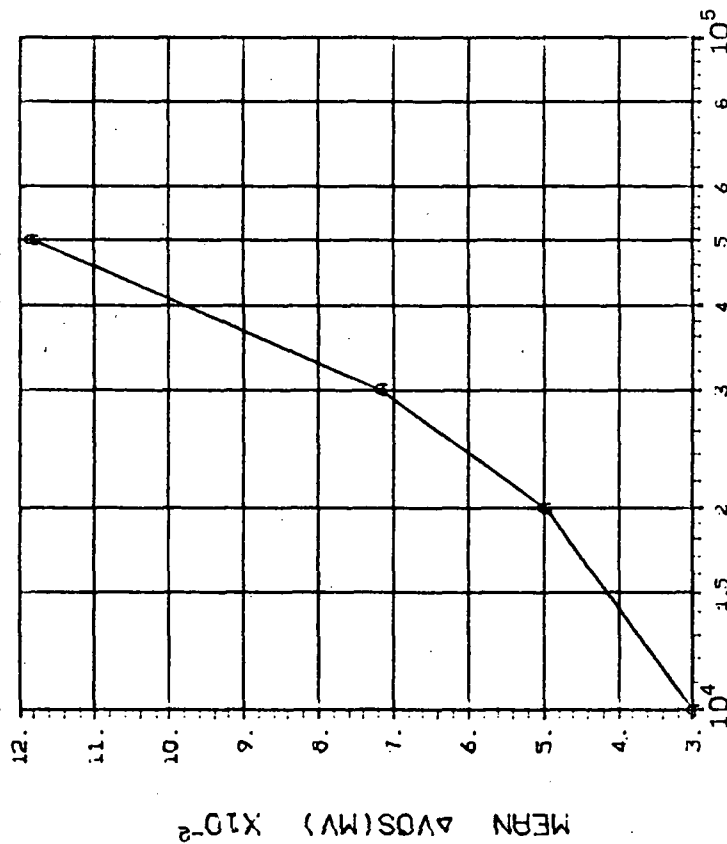
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | *** | .6439 .6592 .6793 **** |

INITIAL MEAN VALUE -GAIN(DB) = 9.52X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-1 DATE CODE 8218

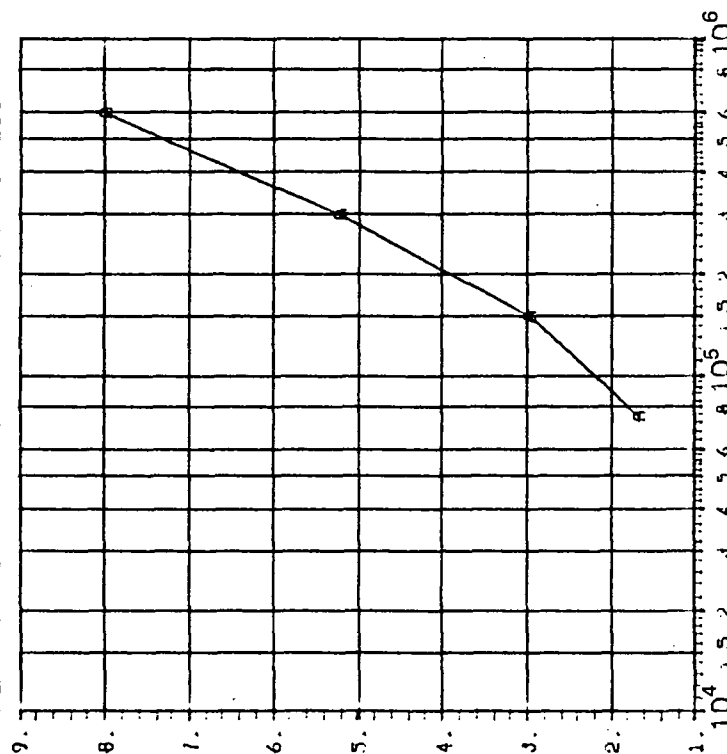


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 20 30 50 |
| | .0245 .0219 .0331 .0462 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-2 DATE CODE 8218

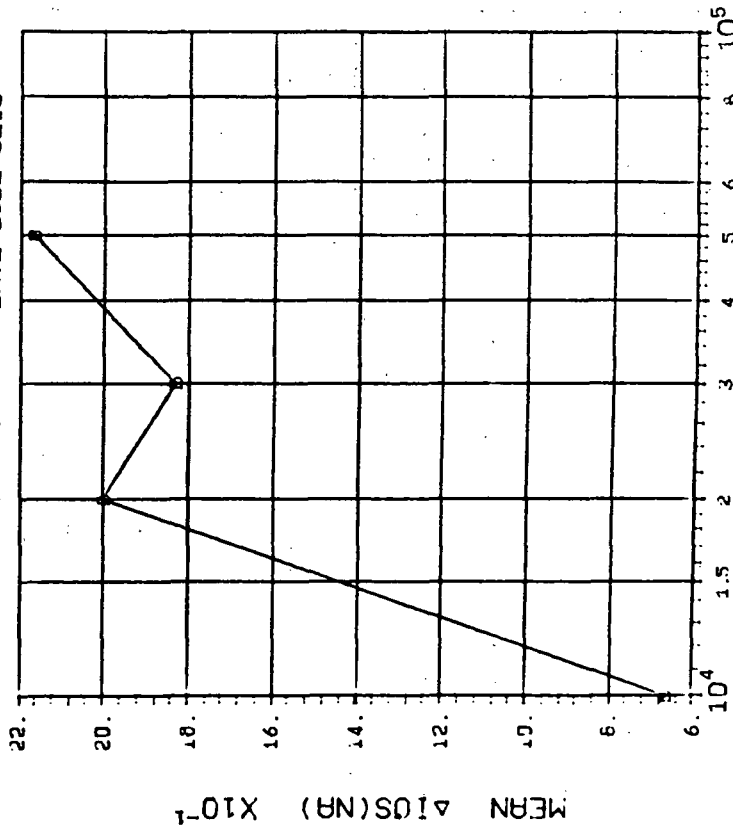


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 600 |
| | .0402 .0793 .1116 .1341 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

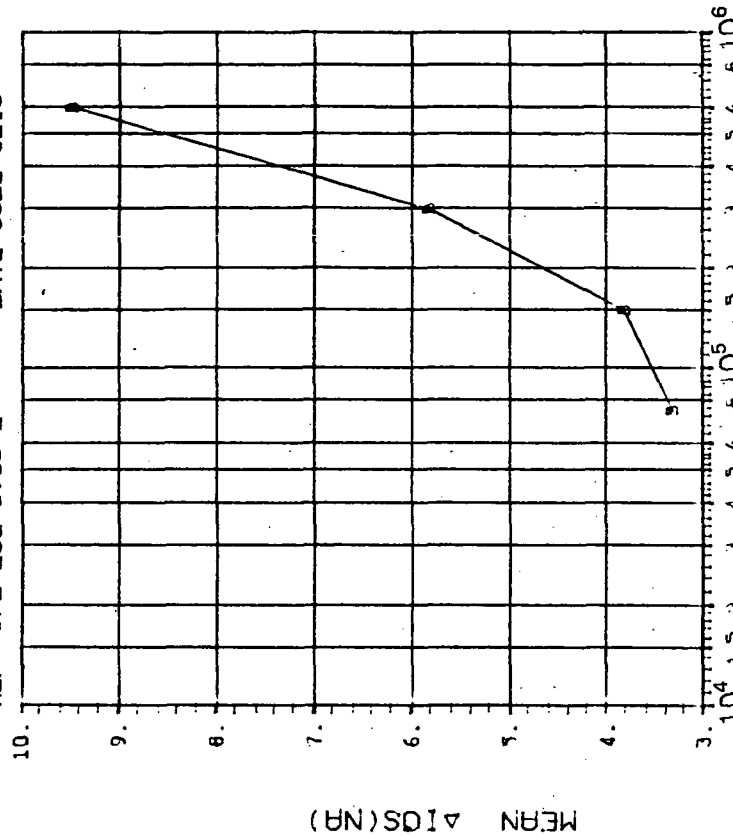
(2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| 5 | 10 | 50 |
| | 20 | 30 |
| | .5164 | 1.095 |
| | 1.169 | .7528 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-2 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

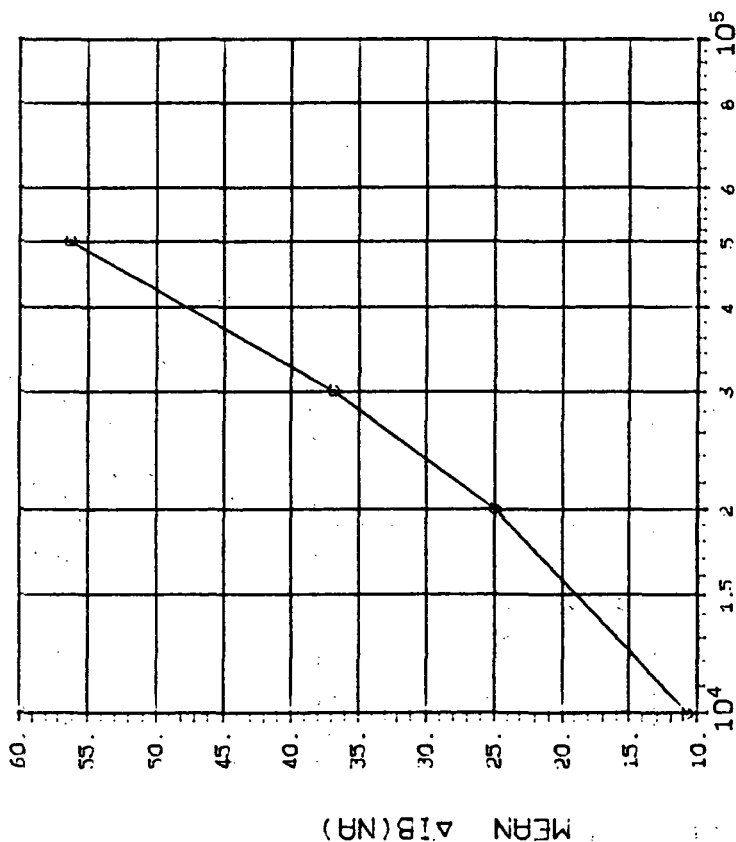
(2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| 5 | 75 | 300 |
| | 150 | 600 |
| | 1.033 | 1.329 |
| | 3.251 | 4.278 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-1 DATE CODE 8218

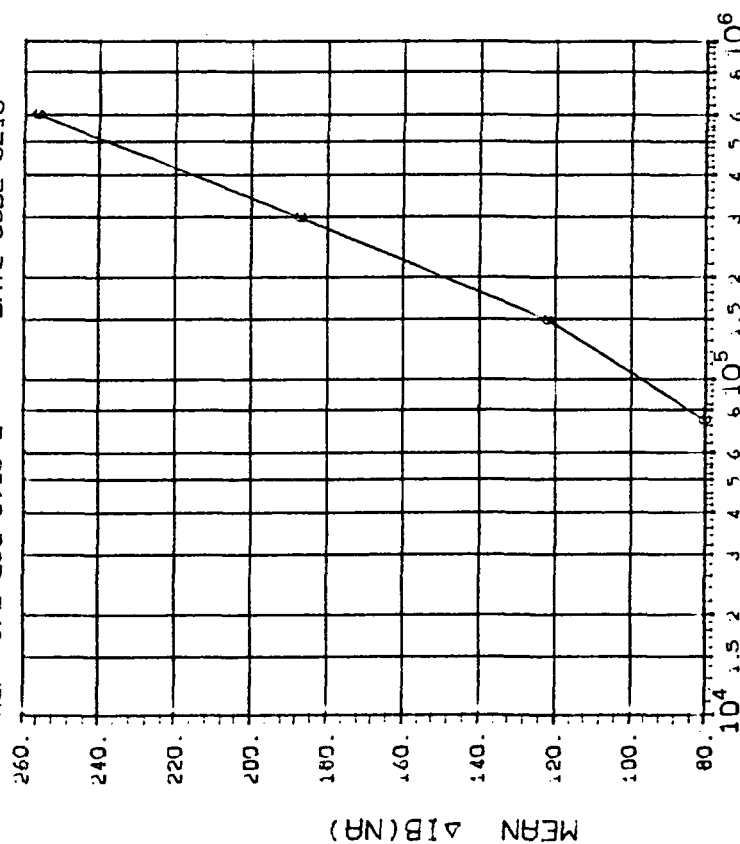


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| | 50 |
| C | 11.16 |
| | 20.04 |
| | 26.95 |
| | 35.30 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-2 DATE CODE 8218

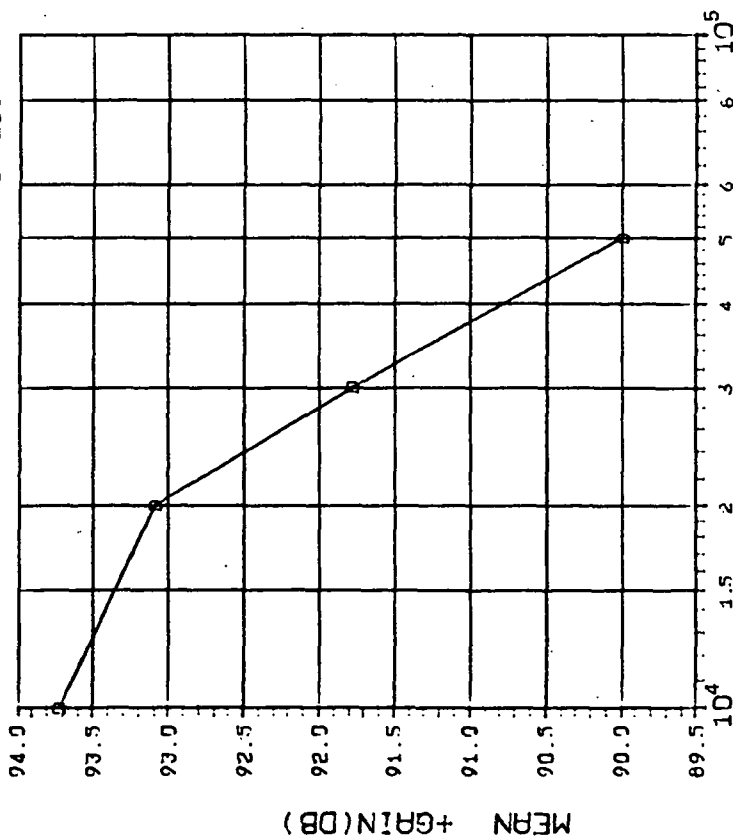


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| C | 39.05 |
| | 41.13 |
| | 43.17 |
| | 45.97 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-1 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN(DB) VS DOSE

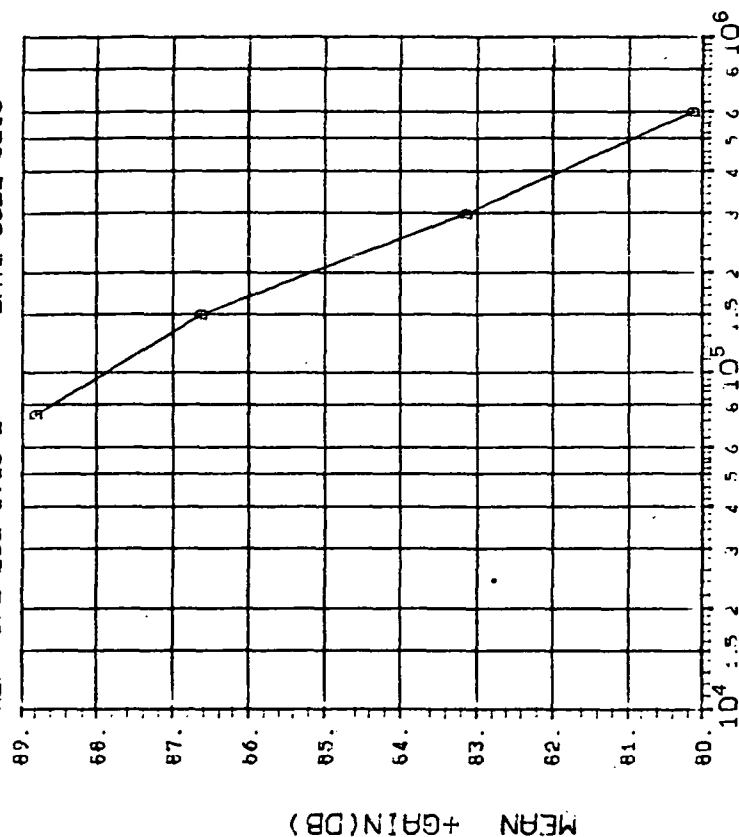
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | **** | 10 20 30 50 |
| | | 1.424 1.404 1.041 .9843 |

INITIAL MEAN VALUE +GAIN(DB) = 9.51X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-2 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN(DB) VS DOSE

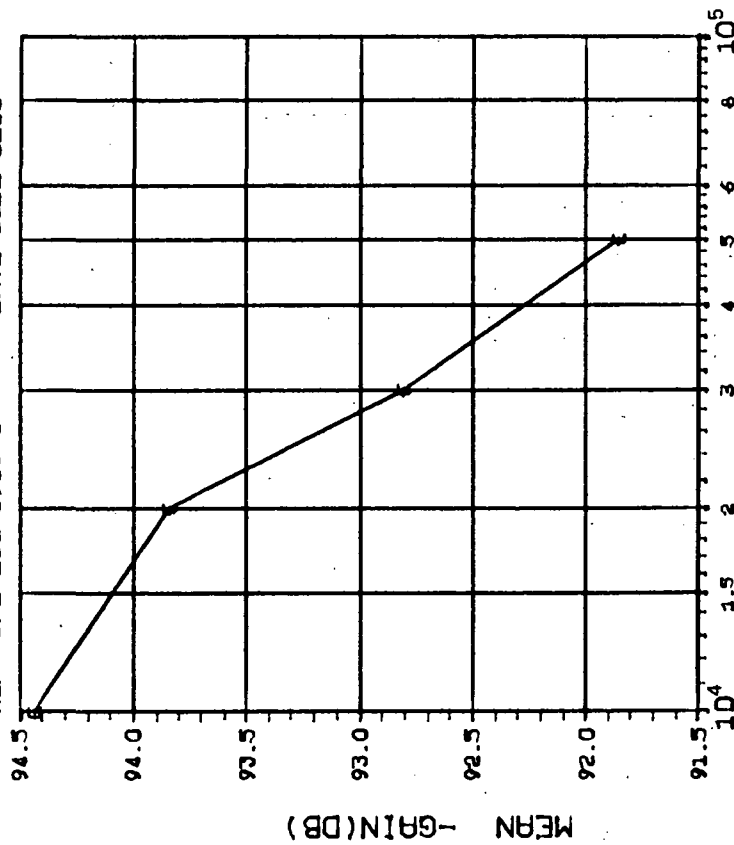
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | **** | 75 150 300 600 |
| | | 1.016 1.025 1.061 .3736 |

INITIAL MEAN VALUE +GAIN(DB) = 9.51X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas
(5)-GAIN(DB) VS DOSE

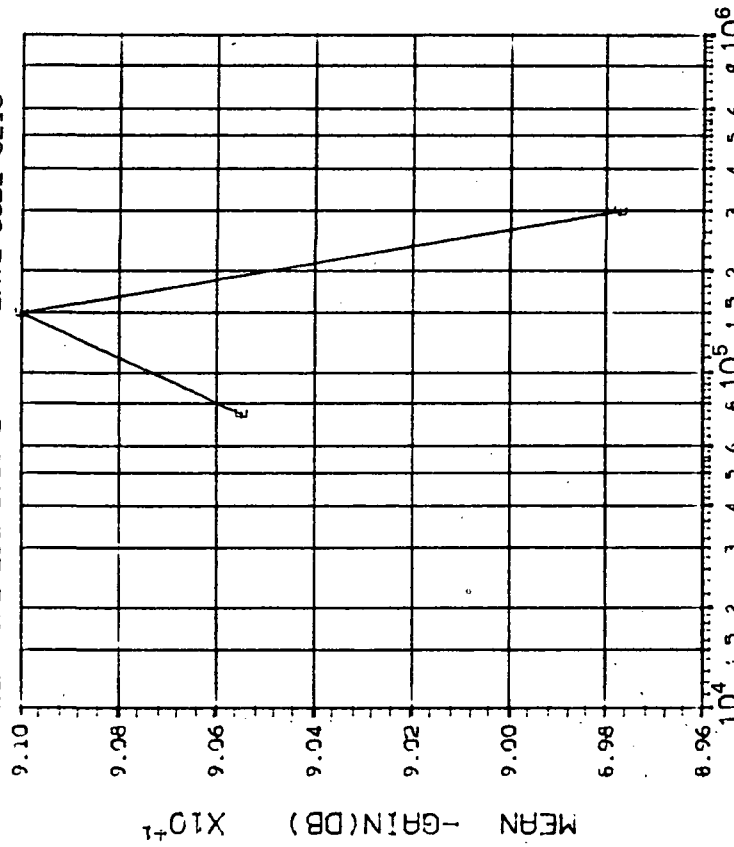
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | .5012 .4444 .9167 1.252 |

INITIAL MEAN VALUE -GAIN(DB) = 9.63X10⁻²

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-3-83

REF: JPL LOG 0905-2 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas
(5)-GAIN(DB) VS DOSE

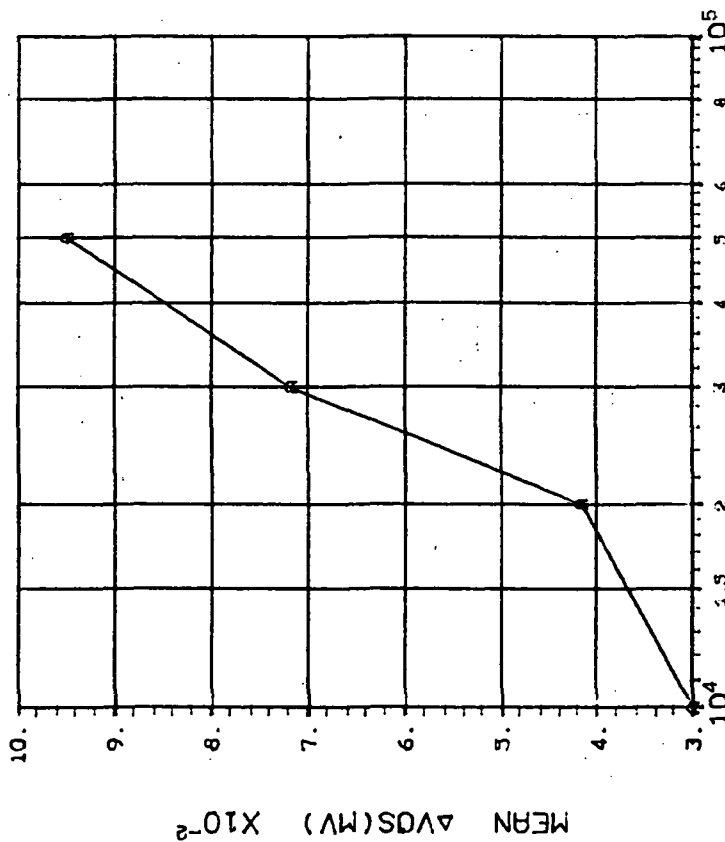
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | .6552 .6559 1.592 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 9.63X10⁻²

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-4-83

REF: JPL LOG 0906-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

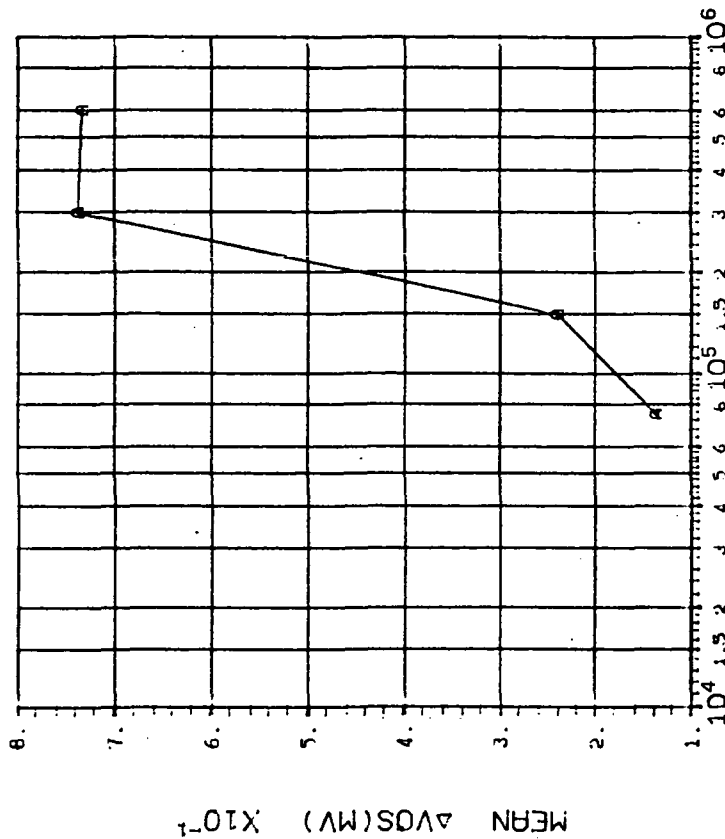
(1)ΔVOS(MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 20 30 50 |
| | .0253 .0172 .0627 .0509 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-4-83

REF: JPL LOG 0906-2 DATE CODE 8218

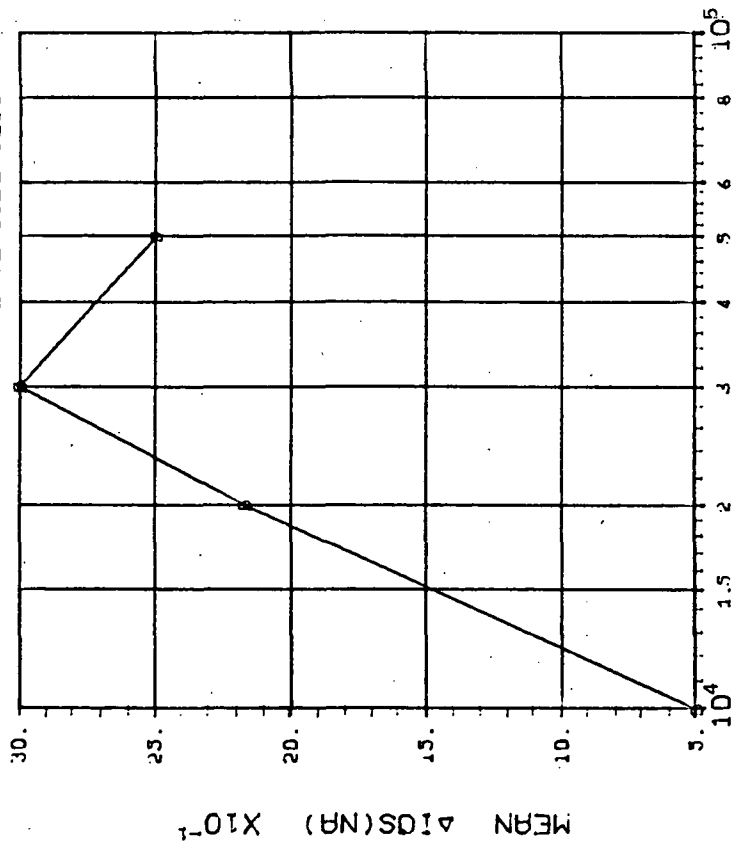


DOSE, rads(Si) Co 60 Gammas

(1)ΔVOS(MV) VS DOSE

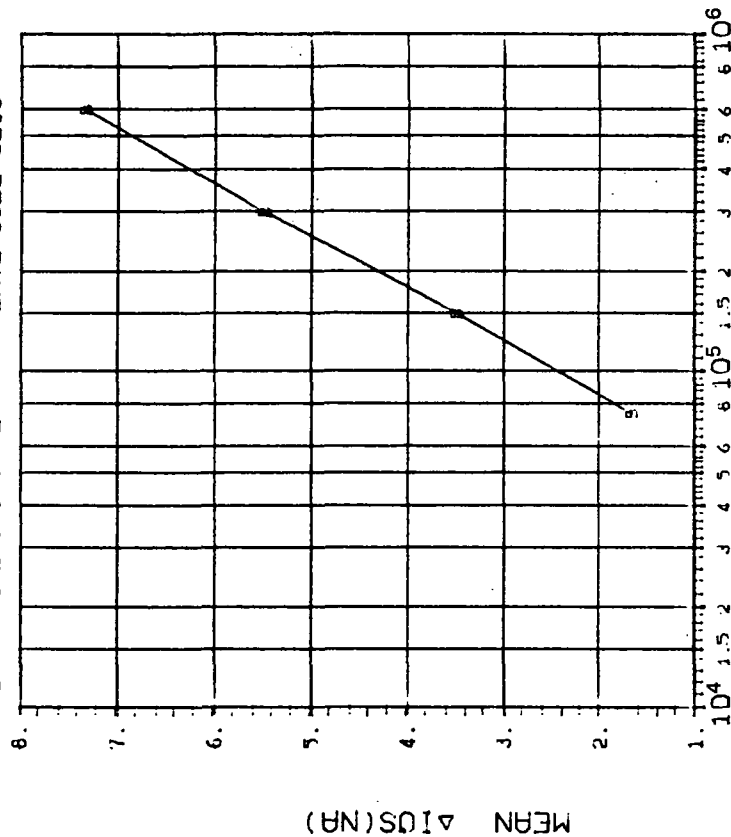
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 600 |
| | .0644 .0556 .6401 .1286 |

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 8-4-83
REF: JPL LOG 0906-1 DATE CODE 8218



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 20 30 50 |
| | .8367 3.430 4.472 3.332 |

DEVICE TYPE: L144 LOW POWER OP AMP
MFG: SIL 6 DEVICES TEST DATE 8-4-83
REF: JPL LOG 0906-2 DATE CODE 8218

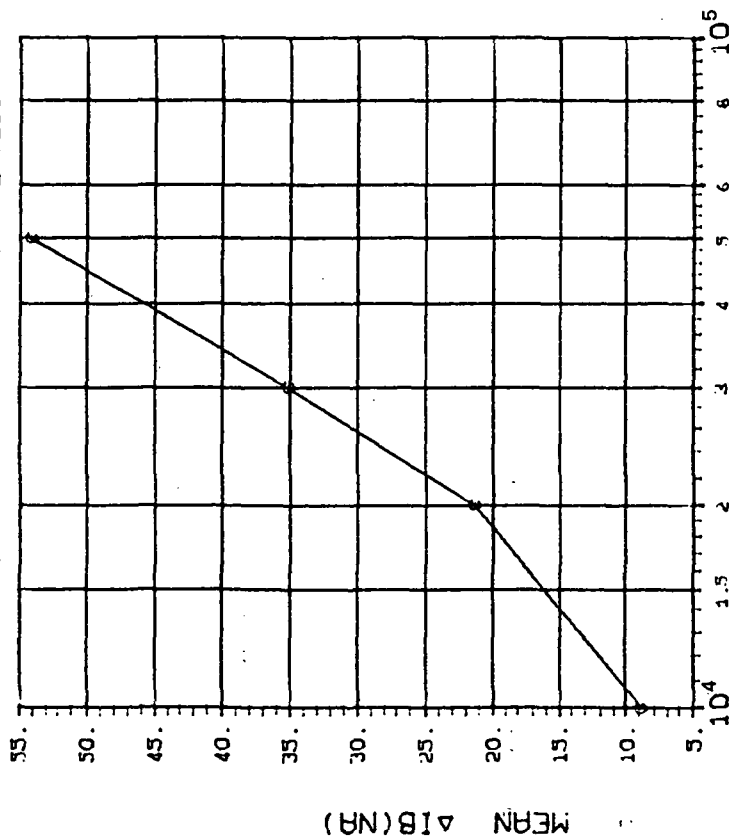


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 150 300 600 |
| | .6165 2.429 2.168 4.412 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-4-83

REF: JPL LOG 0906-1 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

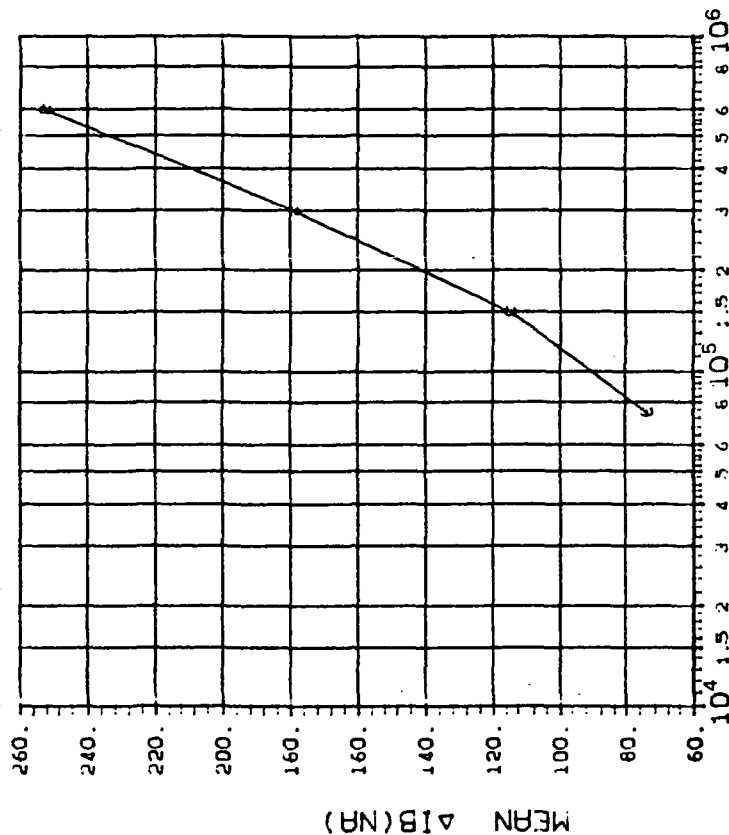
(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 |
| C | 10.58 | 16.13 |
| | 20 | 30 |
| | 23.11 | 29.03 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-4-83

REF: JPL LOG 0906-2 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

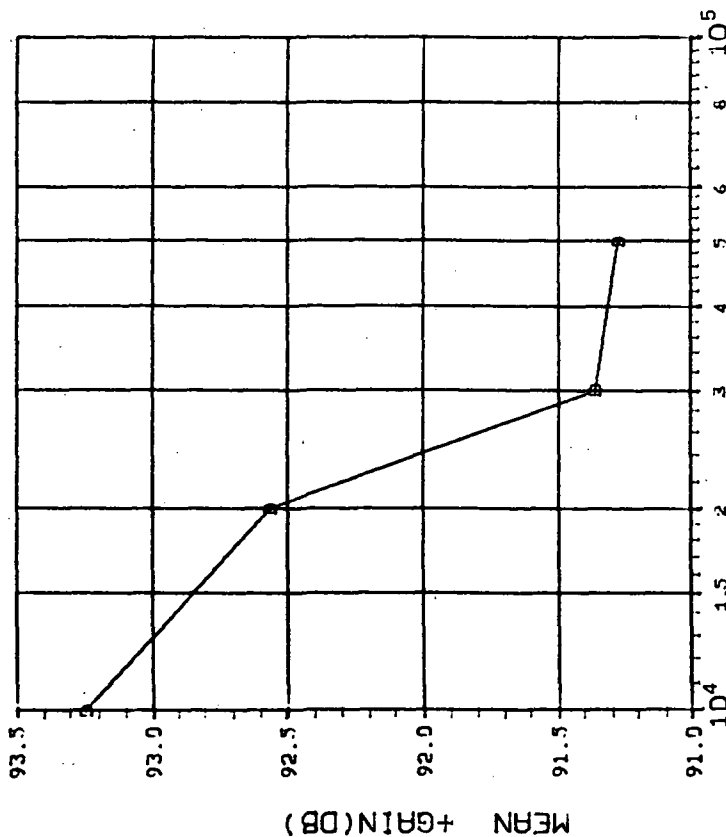
(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 |
| C | 36.99 | 37.37 |
| | 300 | 600 |
| | 37.26 | 41.07 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-4-83

REF: JPL LOG 0906-1 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN(DB) VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

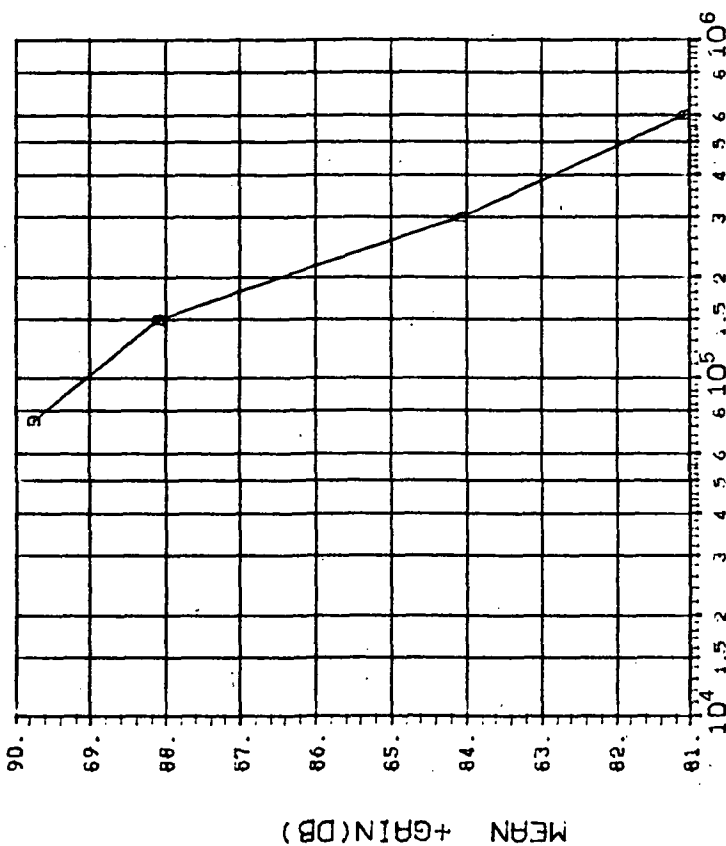
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
|-------|------------------------|-------------------------|
| D | *** | 10 20 30 50 |
| | | 1.739 1.631 1.667 1.133 |

INITIAL MEAN VALUE +GAIN(DB) = 9.34X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-4-83

REF: JPL LOG 0906-2 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN(DB) VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

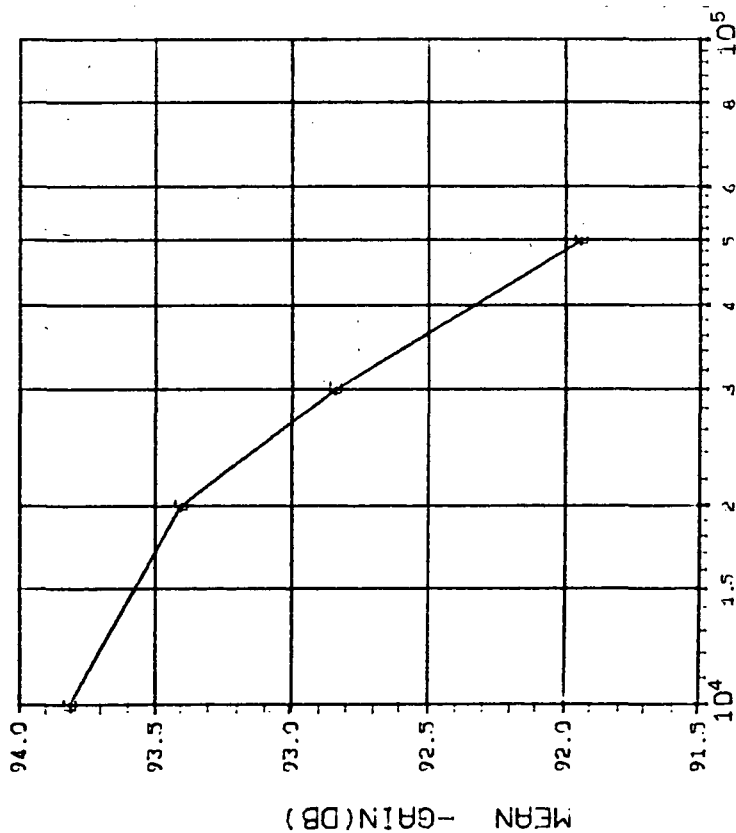
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
|-------|------------------------|-------------------------|
| D | *** | 75 150 300 600 |
| | | 1.236 1.606 1.393 1.374 |

INITIAL MEAN VALUE +GAIN(DB) = 9.34X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-4-83

REF: JPL LOG 0906-1 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN(DB) VS DOSE

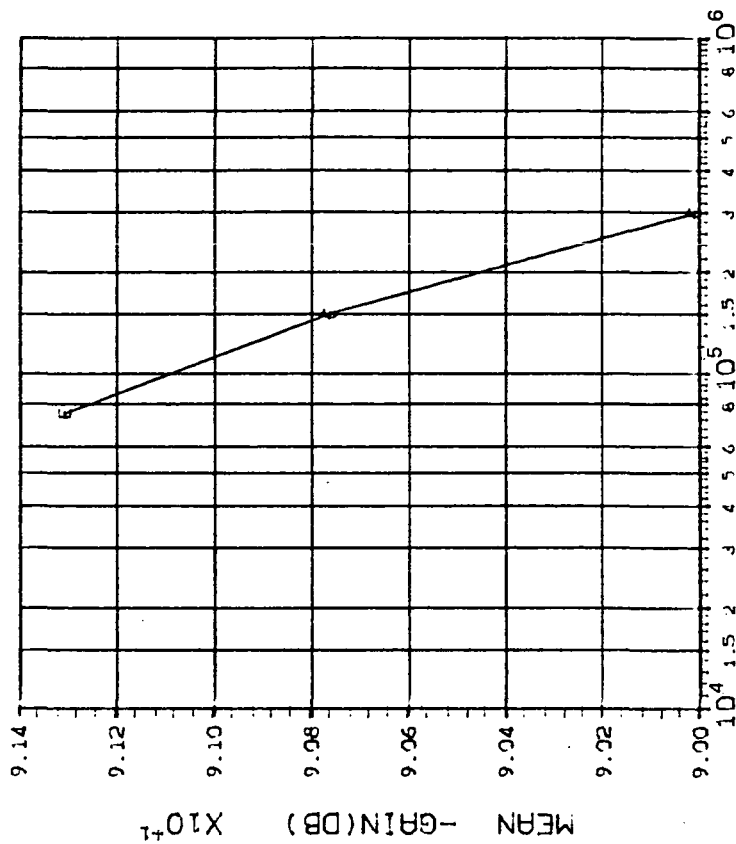
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | *** | 10 20 30 50 |
| | | .9402 1.079 .9512 1.923 |

INITIAL MEAN VALUE -GAIN(DB) = 9.50X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 6-4-83

REF: JPL LOG 0906-2 DATE CODE 8218



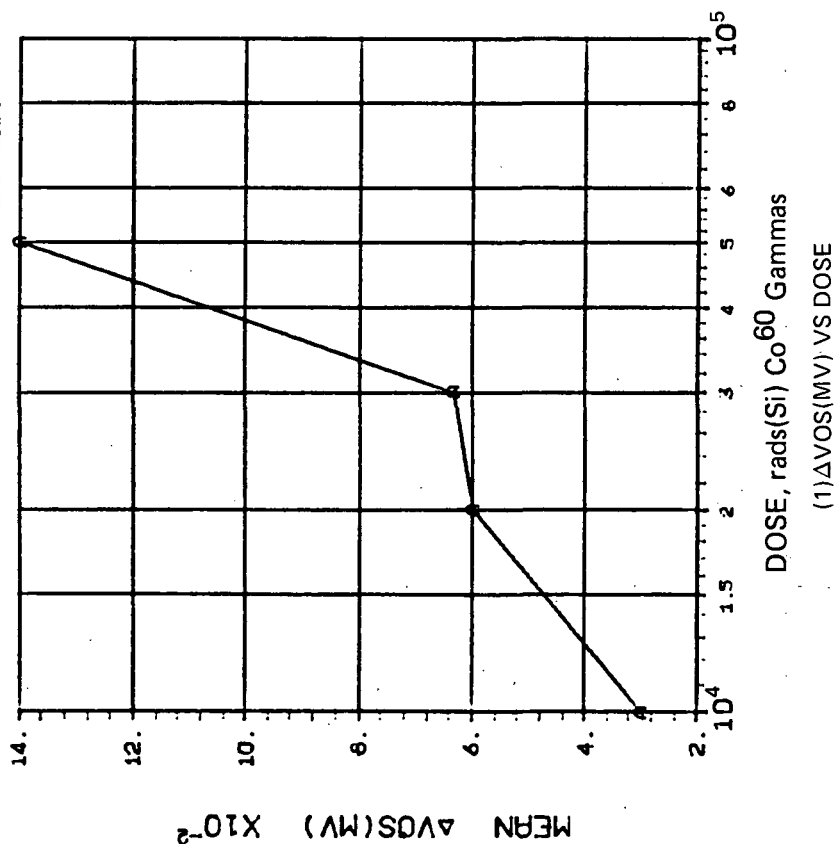
DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN(DB) VS DOSE

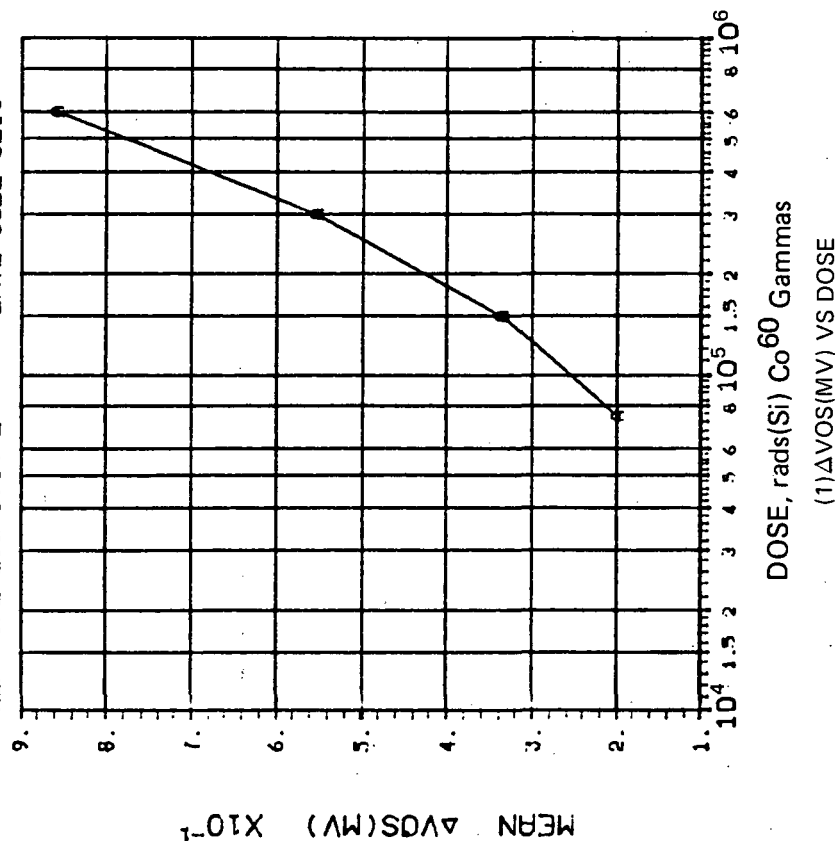
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | *** | 75 150 300 600 |
| | | 1.133 1.116 1.546 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 9.50X10⁺¹

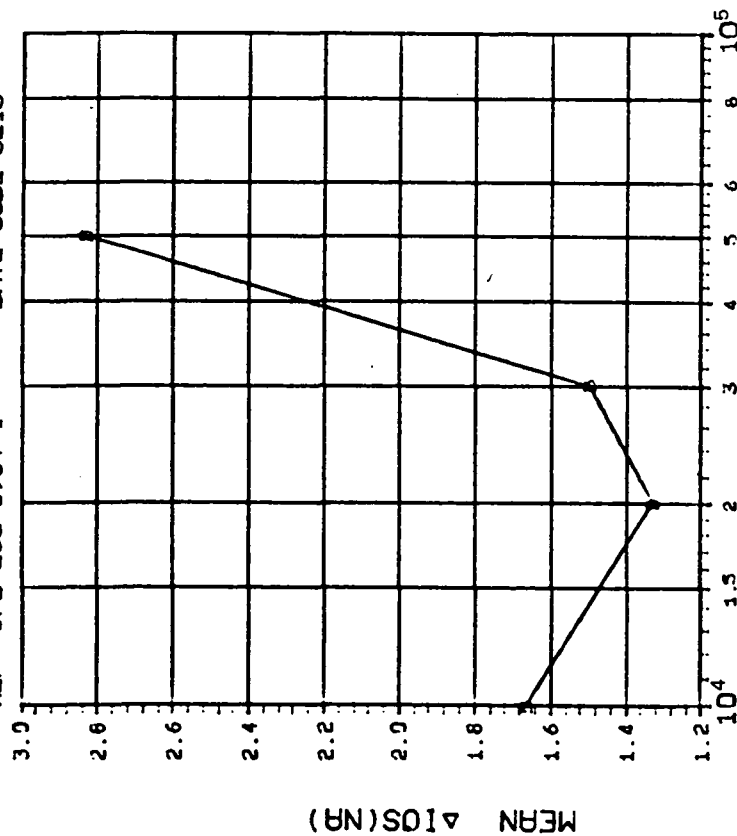
DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 8-09-83
 REF: JPL LOG 0907-1 DATE CODE 8218



DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 8-09-83
 REF: JPL LOG 0907-2 DATE CODE 8218



DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 8-09-83
 REF: JPL LOG 0907-1 DATE CODE 8218

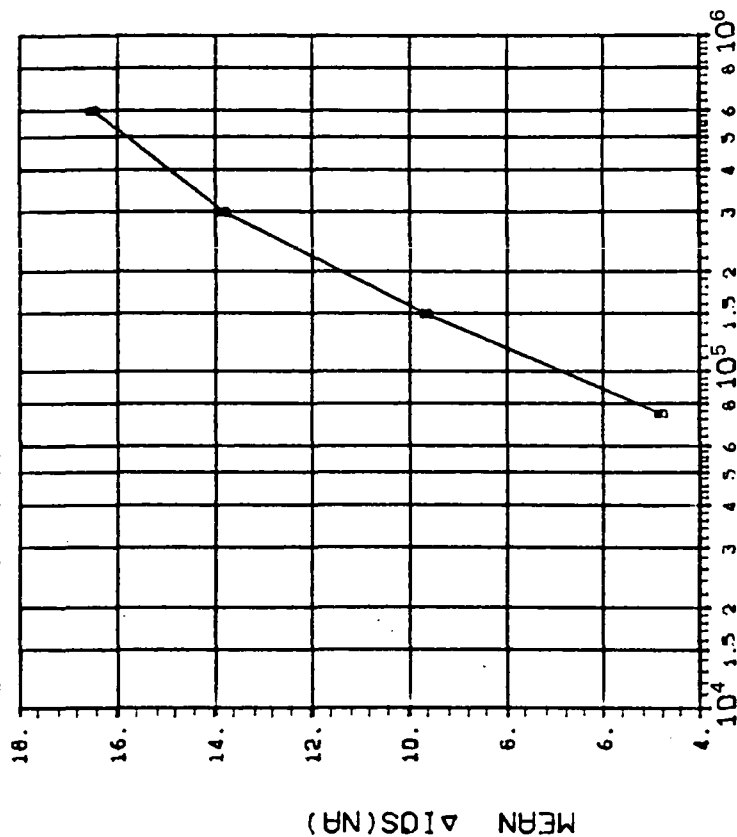


DOSE, rad(Si) Co⁶⁰ Gammas

(2) Δ IOS(NR) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| 5 | 10 20 30 50 |
| | .8165 1.506 2.345 3.076 |

DEVICE TYPE: L144 LOW POWER OP AMP
 MFG: SIL 6 DEVICES TEST DATE 8-09-83
 REF: JPL LOG 0907-2 DATE CODE 8218



DOSE, rad(Si) Co⁶⁰ Gammas

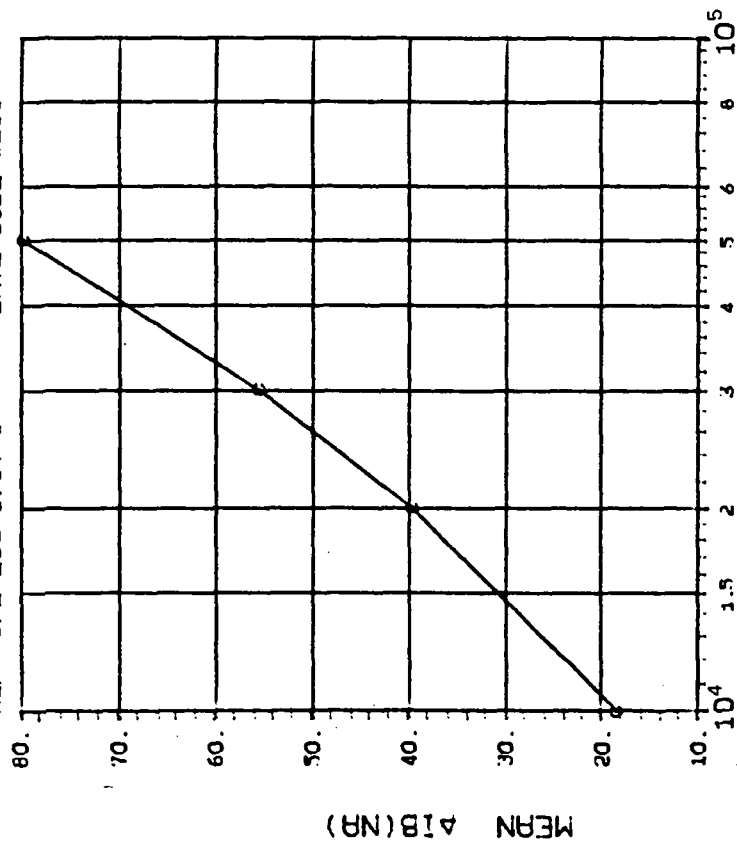
(2) Δ IOS(NR) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| 5 | 75 150 300 600 |
| | 8.448 15.38 18.24 16.93 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 8-09-83

REF: JPL LOG 0907-1 DATE CODE 8218

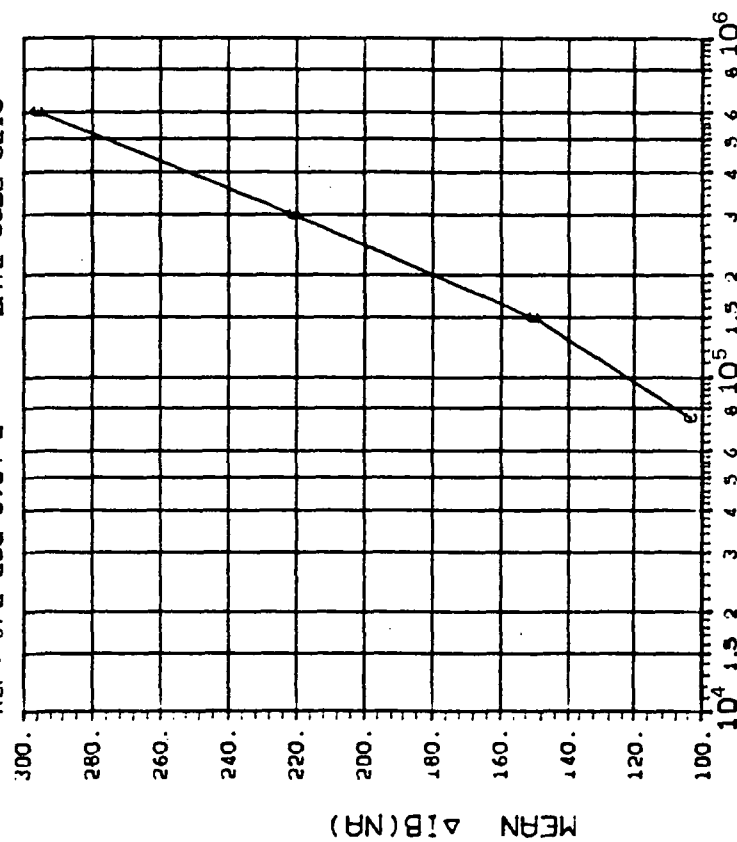


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| 10.93 17.10 24.98 26.20 | |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 8-09-83

REF: JPL LOG 0907-2 DATE CODE 8218

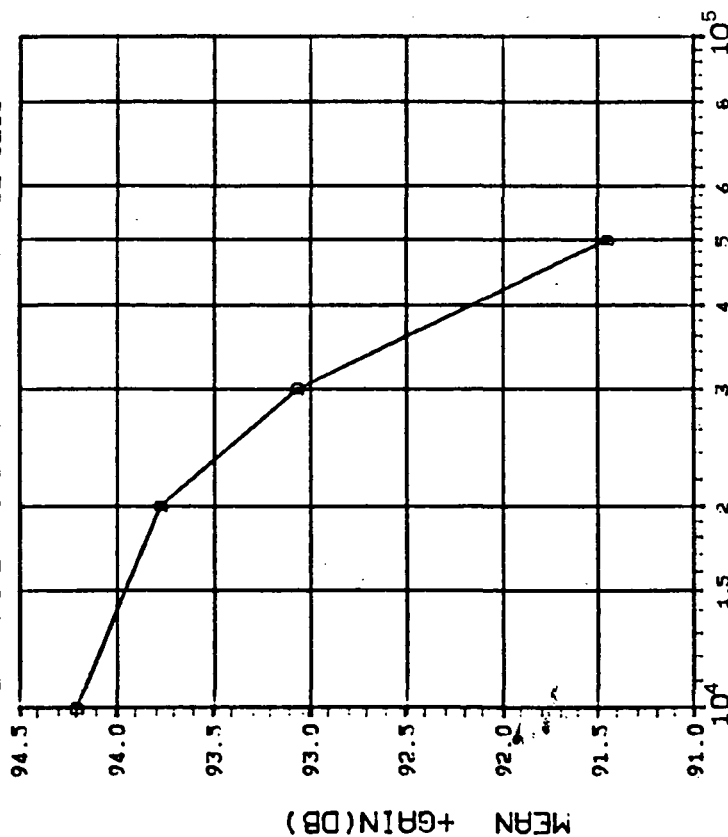


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| 30.07 26.64 24.48 22.68 | |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-09-83

REF: JPL LOG 0907-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN(DB) VS DOSE

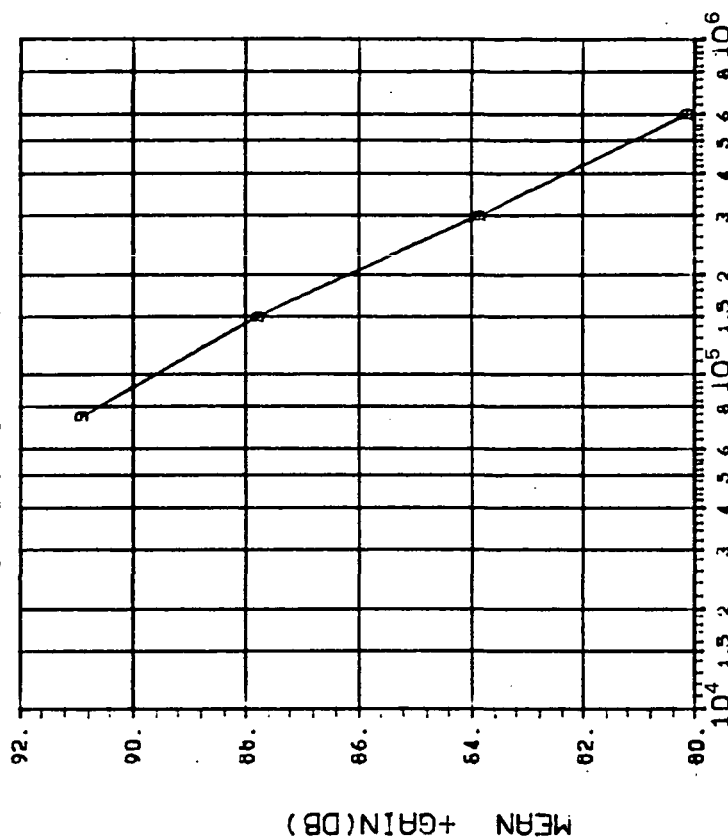
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 10 20 30 50 |
| | | .3497 .5148 .9034 .2929 |

INITIAL MEAN VALUE +GAIN(DB) = 9.45X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-09-83

REF: JPL LOG 0907-2 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN(DB) VS DOSE

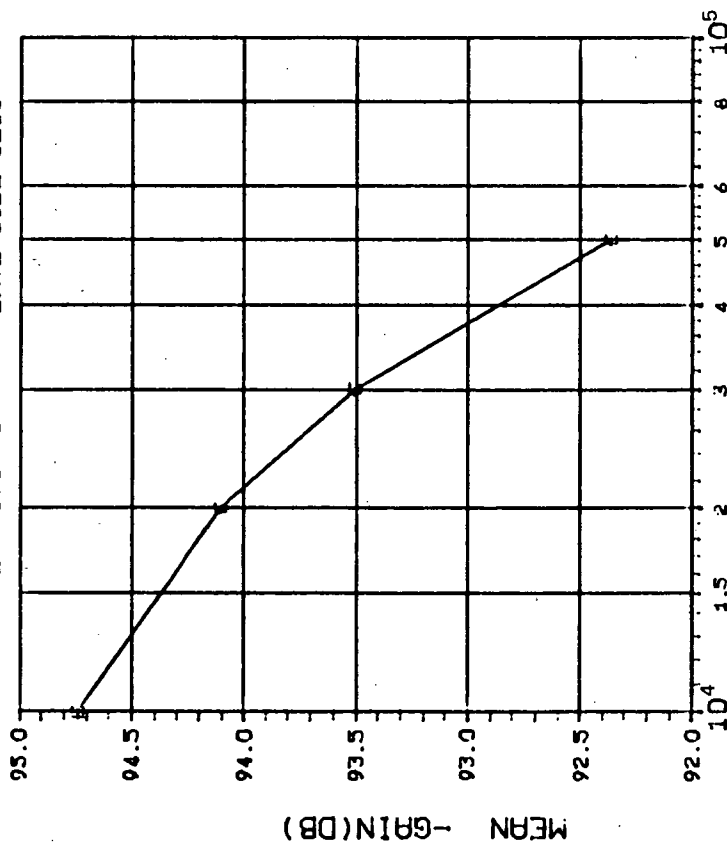
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 75 150 300 600 |
| | | .5430 .4177 .5076 .3736 |

INITIAL MEAN VALUE +GAIN(DB) = 9.45X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-09-83

REF: JPL LOG 0907-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN(DB) VS DOSE

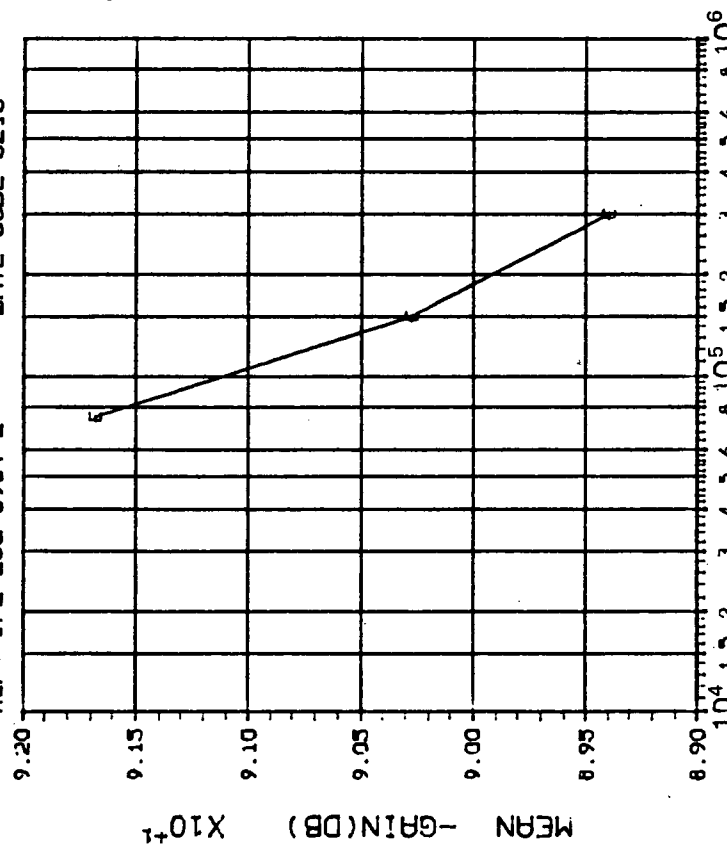
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 10 20 30 50 |
| | | .2873 .5384 .5426 .7913 |

INITIAL MEAN VALUE -GAIN(DB) = 9.50X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-09-83

REF: JPL LOG 0907-2 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN(DB) VS DOSE

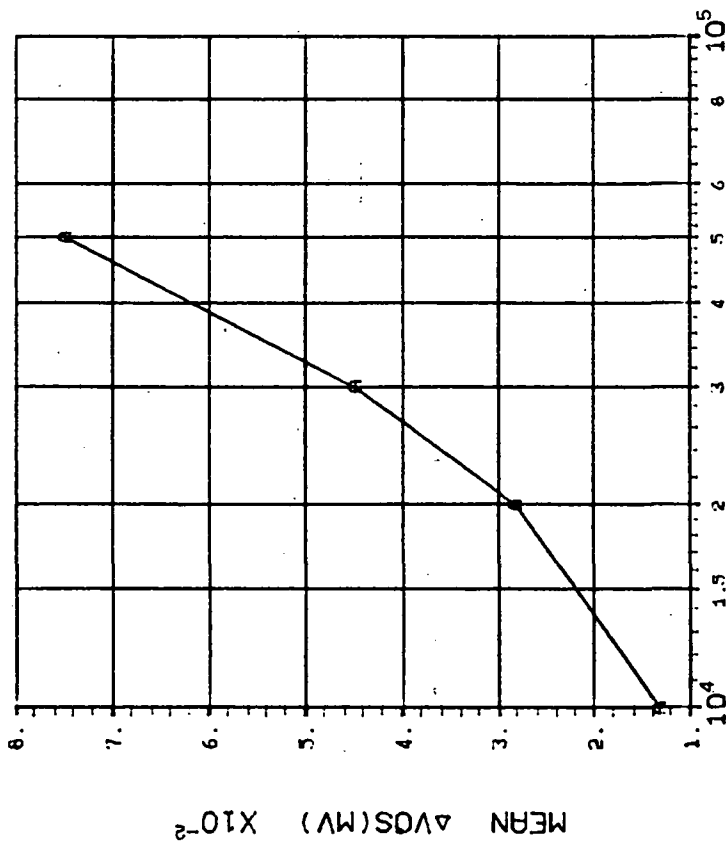
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 75 150 300 600 |
| | | .3995 1.086 1.232 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 9.50X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SJL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

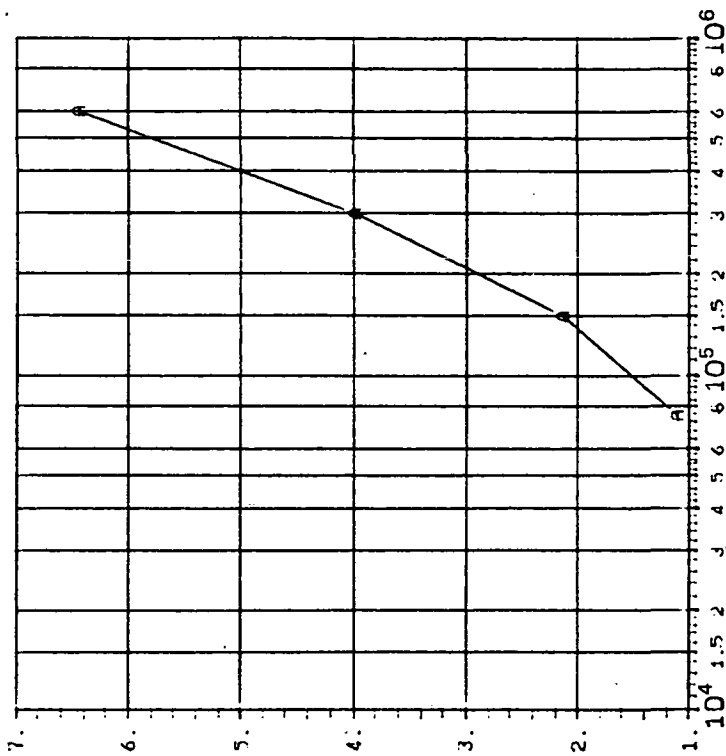
(1) $\Delta VOS(MV)$ VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| A | 10 | 50 |
| | .0151 | .0172 |
| | 30 | .0428 |
| | .0138 | .0428 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SJL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-2 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

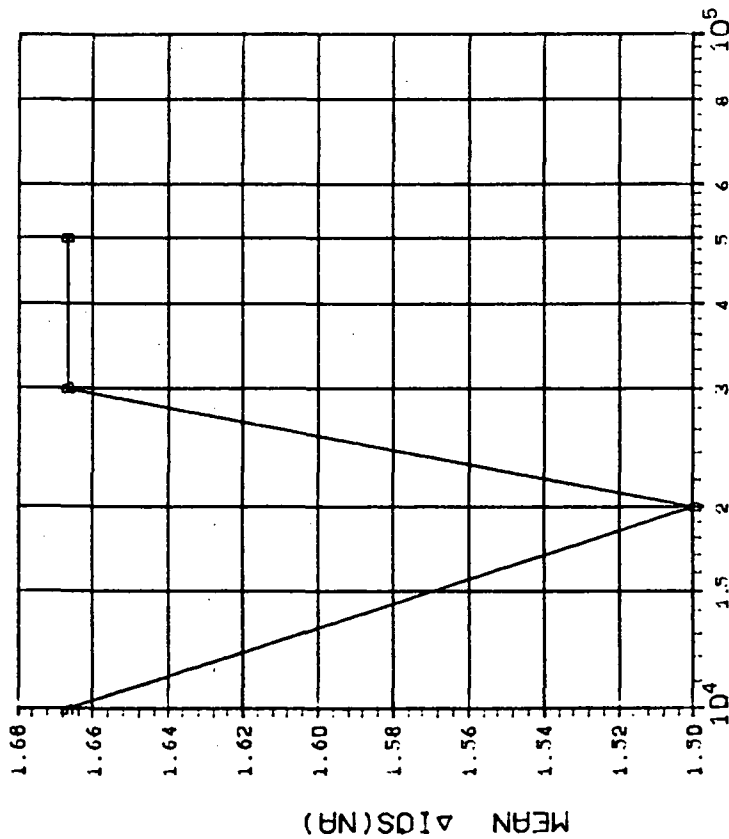
(1) $\Delta VOS(MV)$ VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| A | 75 | 300 |
| | .0643 | .0771 |
| | 600 | .1515 |
| | .1068 | .1515 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

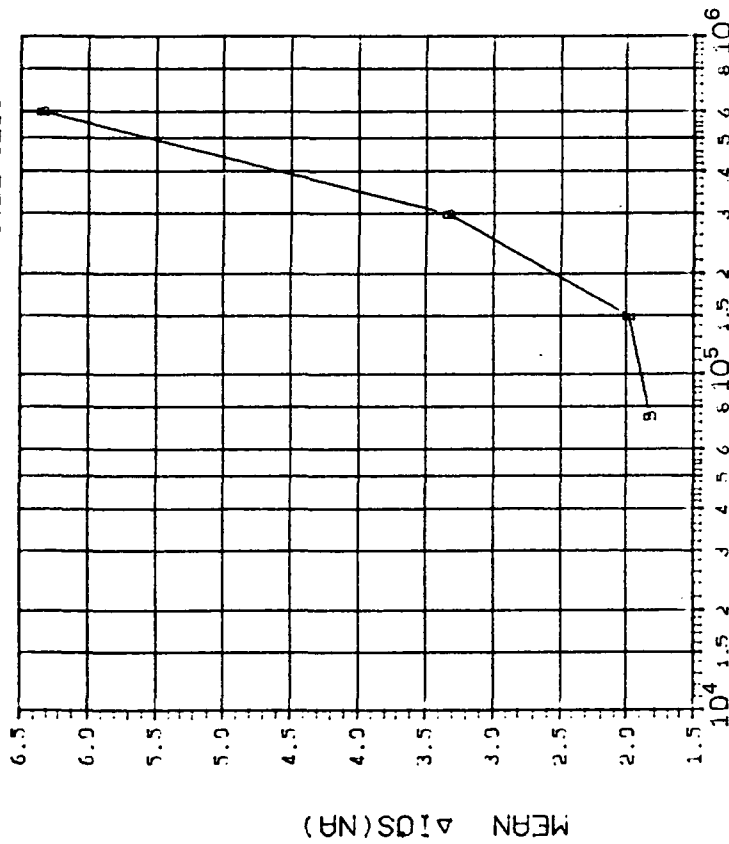
(2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | .6165 | .6367 1.366 1.211 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: S1L 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-2 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

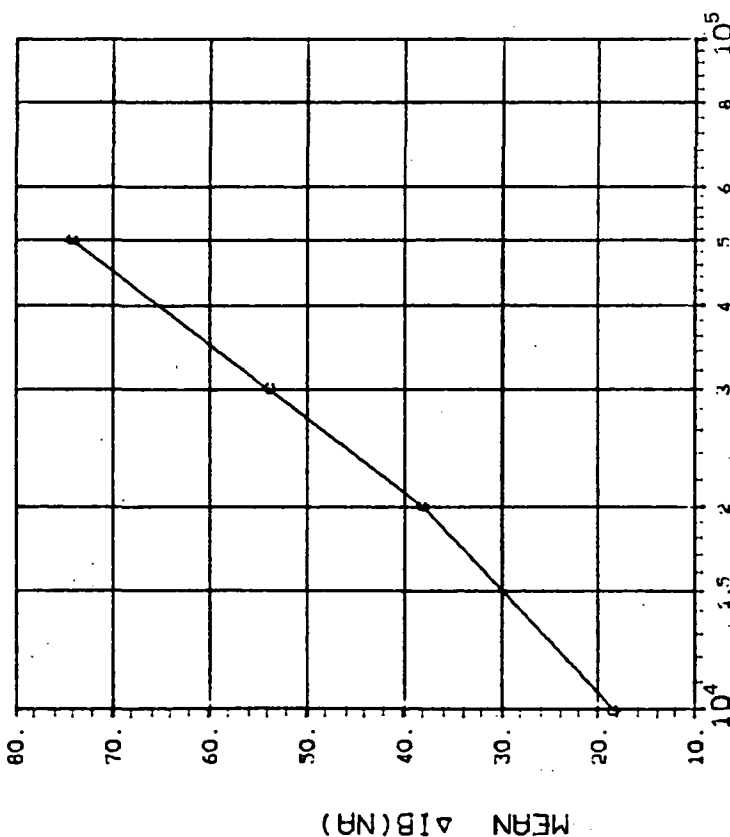
(2)ΔIOS(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| B | .1528 | 1.189 1.562 4.320 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-1 DATE CODE 8216



DOSE, rads(Si) Co⁶⁰ Gammas

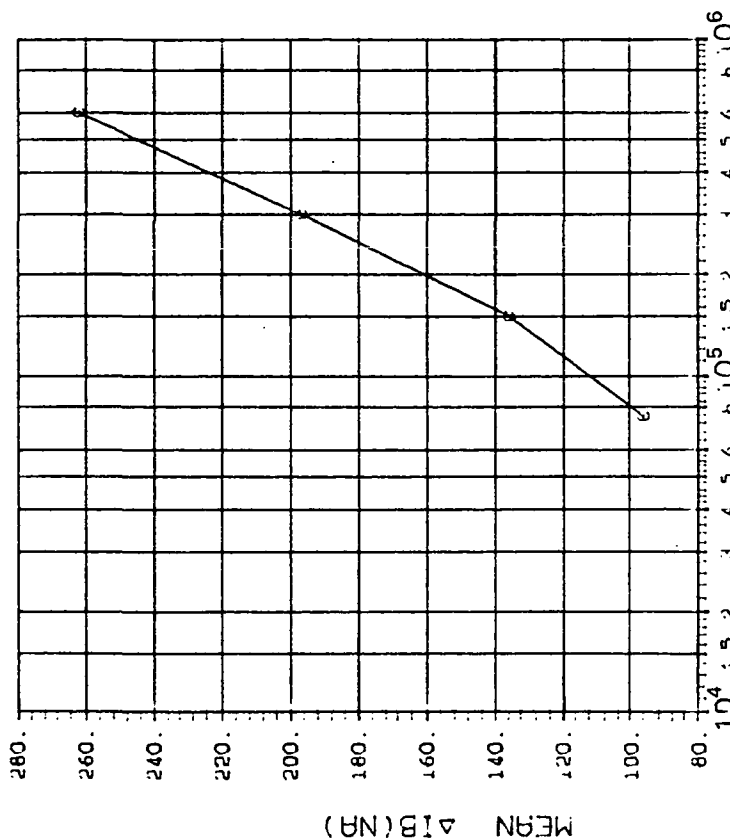
(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | 9.661 | 9.480 9.595 8.160 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-2 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

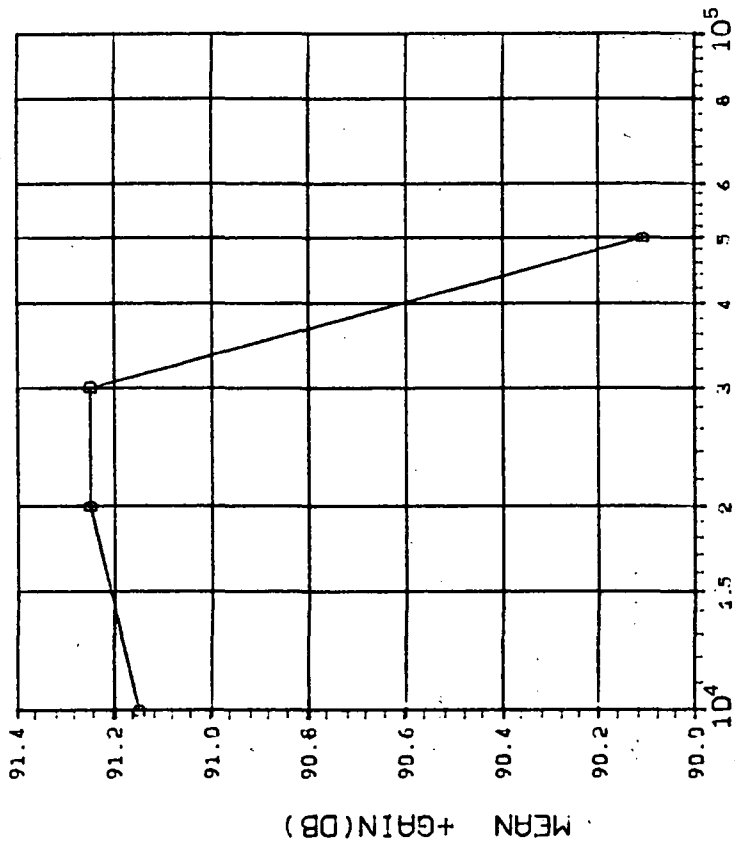
(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| C | 8.607 | 9.284 9.233 10.05 |

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-1 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

(41)+GAIN(DB) VS DOSE

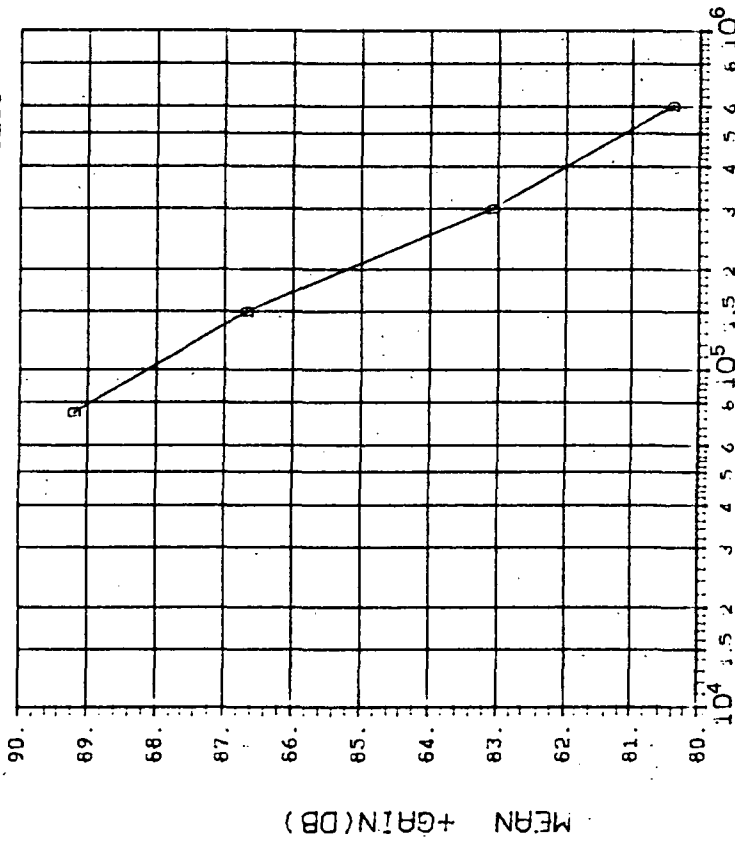
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 10 20 30 50 |
| | | .9395 .6674 .6674 .3608 |

INITIAL MEAN VALUE +GAIN(DB) = 9.27X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-2 DATE CODE 8218



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN(DB) VS DOSE

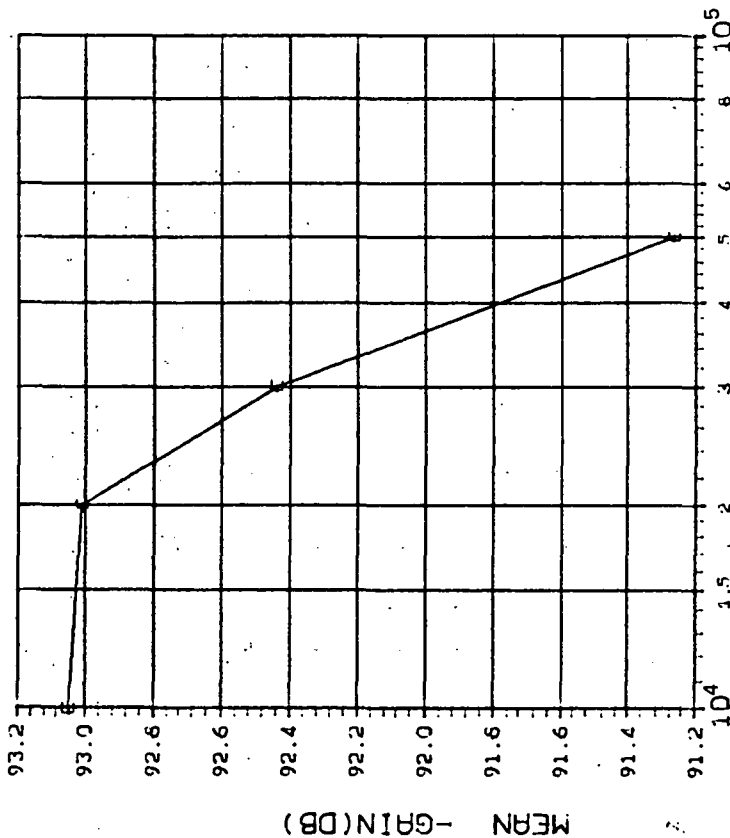
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| D | *** | 75 150 300 600 |
| | | 1.118 1.001 .7210 1.020 |

INITIAL MEAN VALUE +GAIN(DB) = 9.27X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-1 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

(5)--GAIN(DB) VS DOSE

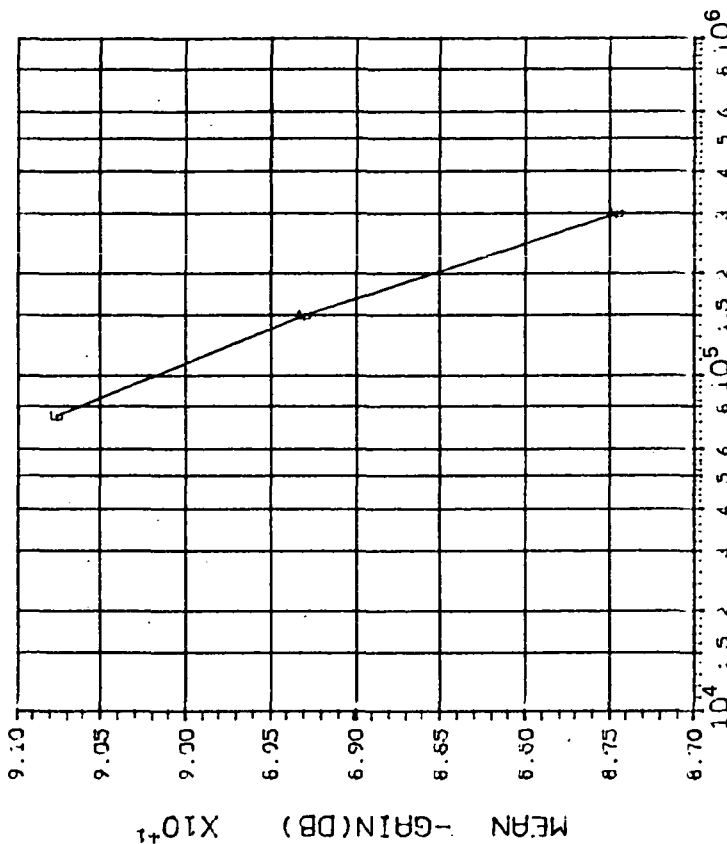
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 10 20 30 50 |
| | | 1.612 1.962 1.241 .7104 |

INITIAL MEAN VALUE -GAIN(DB) = 9.37X10⁺¹

DEVICE TYPE: L144 LOW POWER OP AMP

MFG: SIL 6 DEVICES TEST DATE 8-10-83

REF: JPL LOG 0908-2 DATE CODE 8218



DOSE, rads(Si) Co⁶⁰ Gammas

(5)--GAIN(DB) VS DOSE

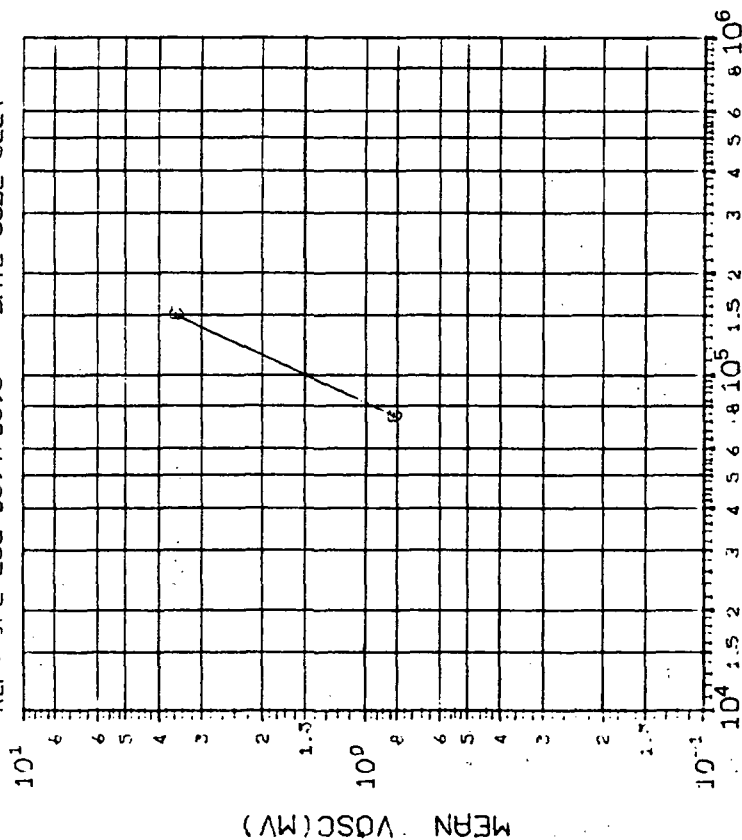
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (uA) | DOSE, kilorads(Si) |
| E | **** | 75 150 300 600 |
| | | 1.116 1.969 .6175 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 9.37X10⁺¹

DEVICE TYPE: L161 QUAD COMPARTOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0897-0898 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

(3) VOSC (V0=0) IN MV: VS DOSE

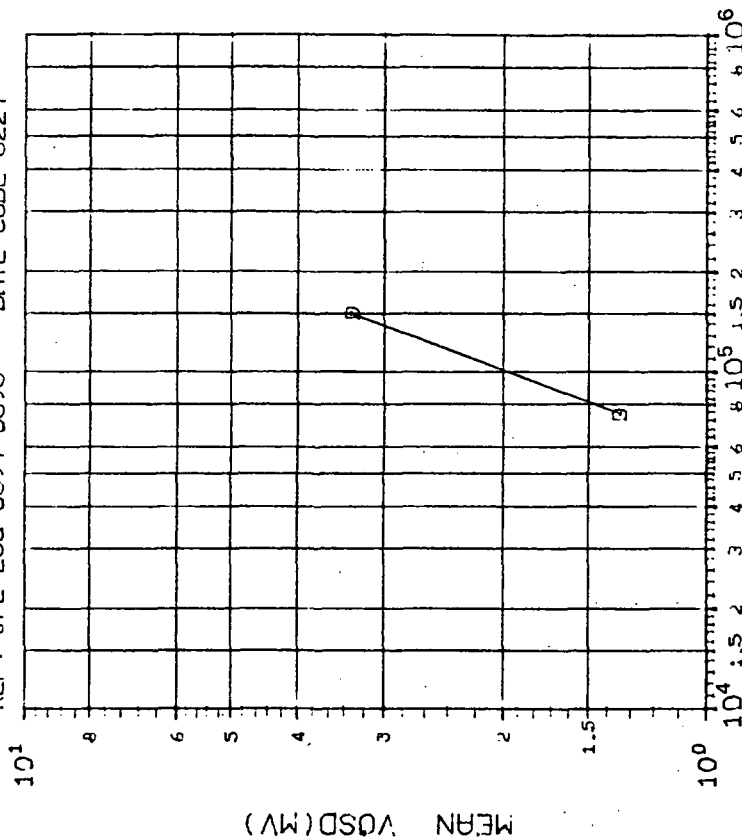
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| 1.635 2.936 **** | |

INITIAL MEAN V-VALUE VOSC(MV) = 2.80X10⁻¹

DEVICE TYPE: L161 QUAD COMPARTOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0897-0898 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

(4) VOSD (V0=0) IN MV: VS DOSE

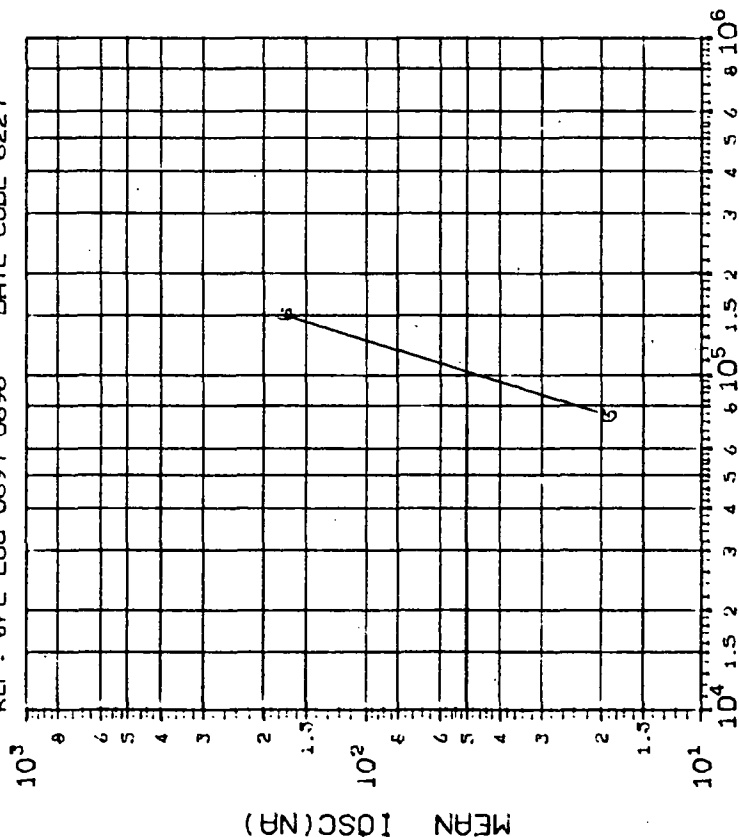
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| 1.538 1.931 **** | |

INITIAL MEAN VALUE VOSD(MV) = 1.42X10⁻⁰

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0897-0896 DATE CODE 8227



DOSE, rads(Si) Co60 Gammas

(7) IOSC (V0=0) IN NA: VS DOSE

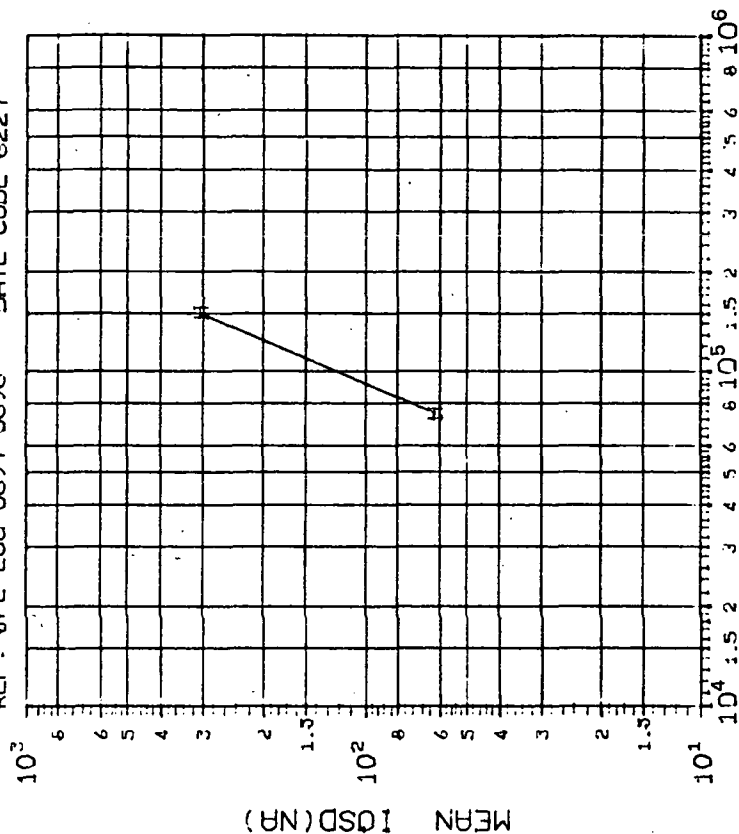
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| G | 75 |
| | 150 |
| | 300 |
| 7.524 68.36 **** | |

INITIAL MEAN VALUE IOSC(NR) = 9.66×10^{-1}

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0897-0898 DATE CODE 8227



DOSE, rads(Si) Co60 Gammas

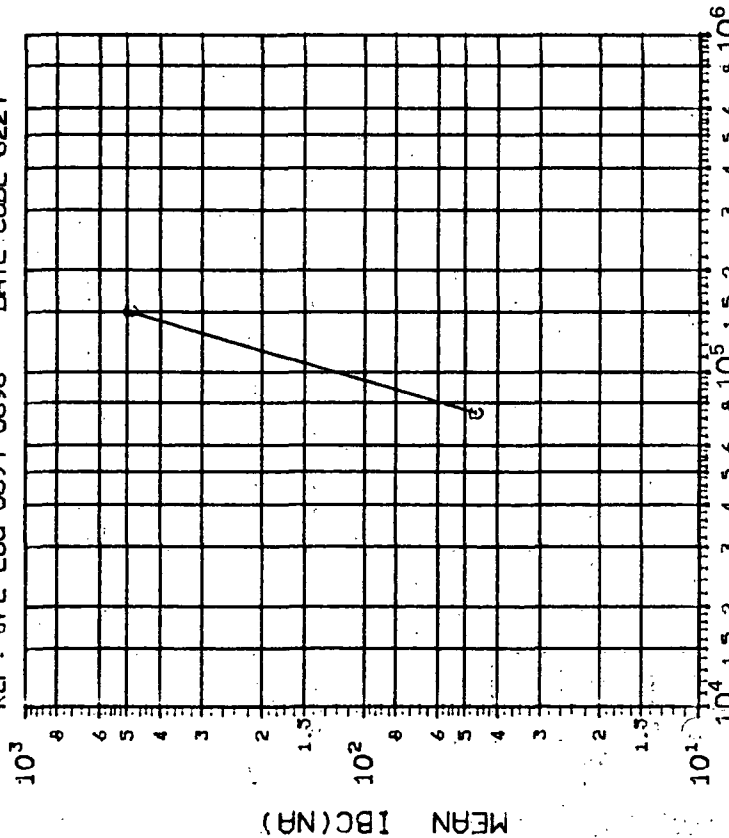
(8) IOSD (V0=0) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| H | 75 |
| | 150 |
| | 300 |
| 39.55 151.5 **** | |

INITIAL MEAN VALUE IOSD(NR) = 5.59×10^{-0}

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83
REF: JPL LOG 0897-0898 DATE CODE 8227



DOSE, rads(Si) Co 60 Gammas

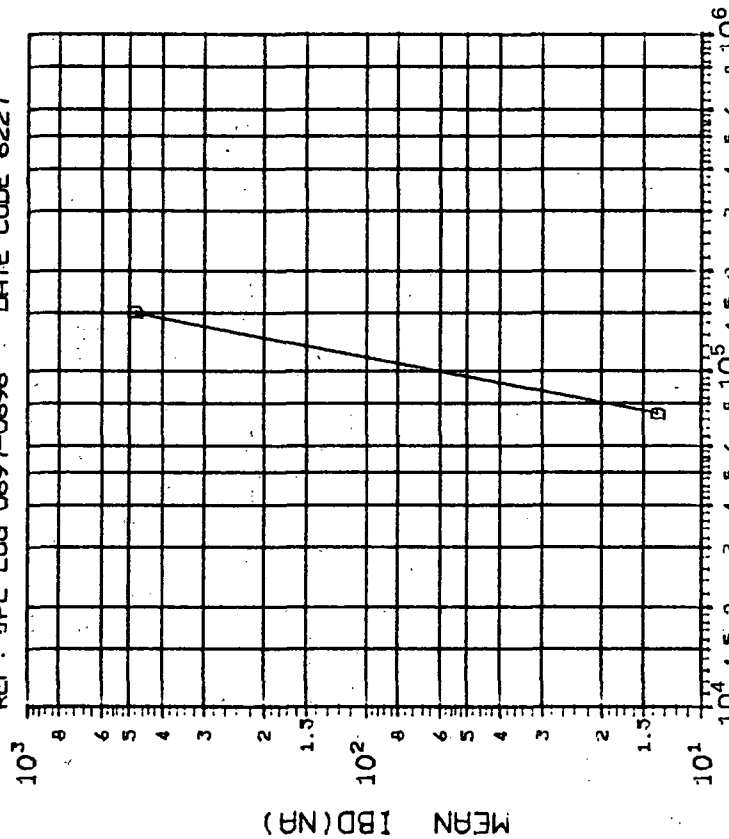
(3) IBC (VO=0) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| 68.04 372.0 **** | |

INITIAL MEAN VALUE IBC(NA) = 3.21X10⁻¹

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83
REF: JPL LOG 0897-0898 DATE CODE 8227



DOSE, rads(Si) Co 60 Gammas

(4) IBD (VO=0) IN NA: VS DOSE

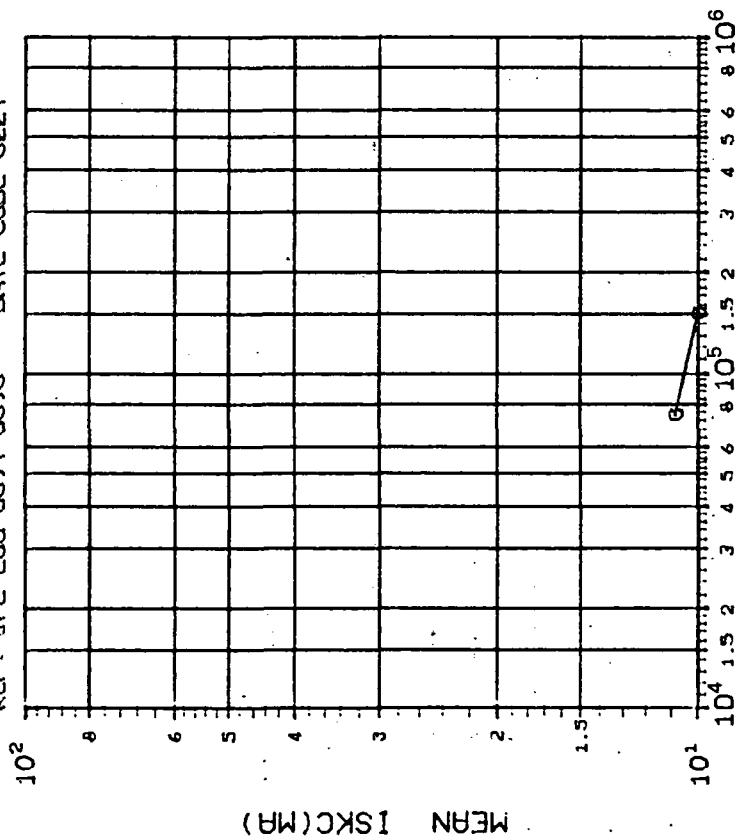
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| 69.46 386.9 **** | |

INITIAL MEAN VALUE IBD(NA) = 3.06X10⁻¹

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0897-0898 DATE CODE 8227



(7) ISKC (V0=-V+1.5V, VIN=-100MV) IN VS DOSE

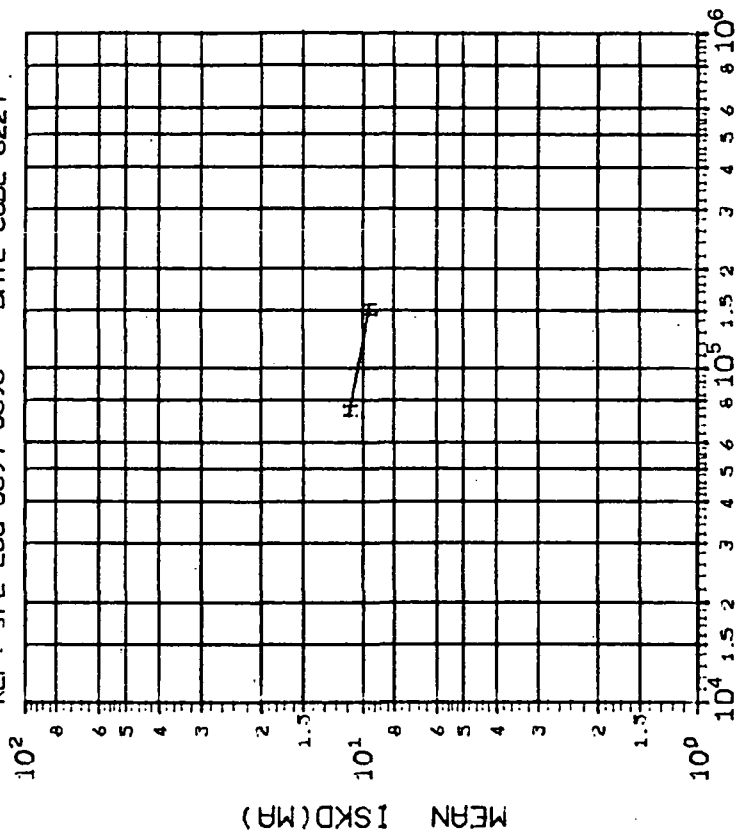
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| G | 75 150 300 |
| | .7383 .7999 **** |

INITIAL MEAN VALUE ISKC(MA) = $1.19 \times 10^{+1}$

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0897-0898 DATE CODE 8227



(8) ISKD (V0=-V+1.5V, VIN=-100MV) IN VS DOSE

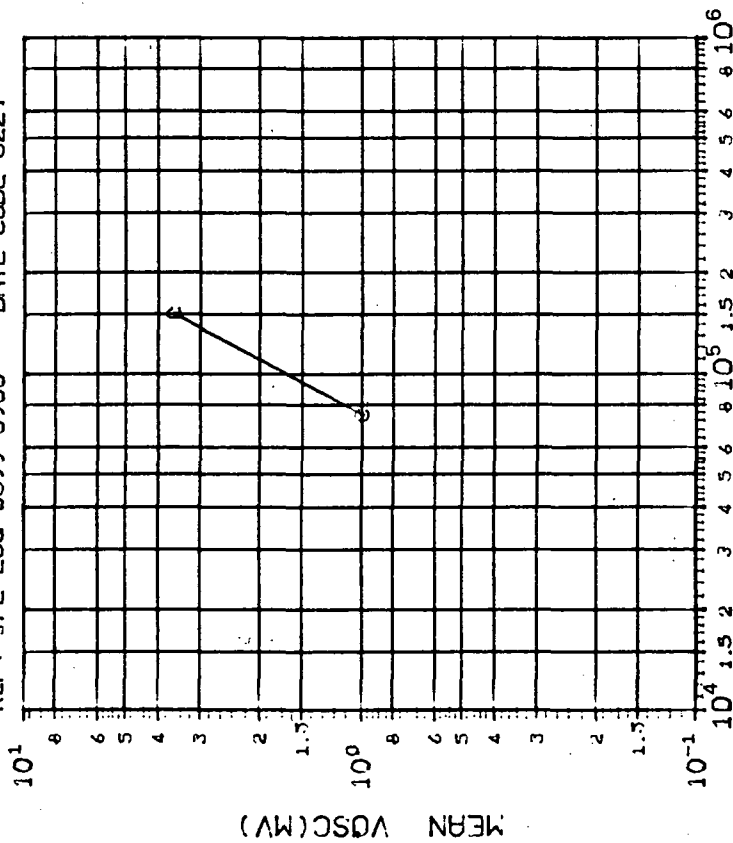
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| H | 75 150 300 |
| | .7391 .8440 **** |

INITIAL MEAN VALUE ISKD(MA) = $1.19 \times 10^{+1}$

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

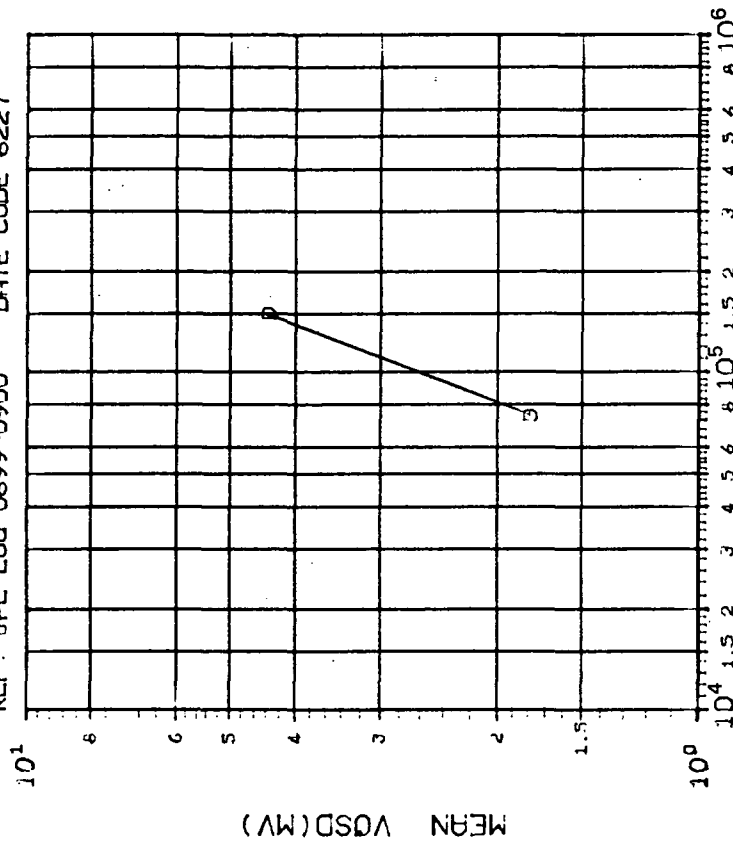
REF: JPL LOG 0899-0900 DATE CODE 8227



DEVICE TYPE: L161 QUAD COMPARATOR

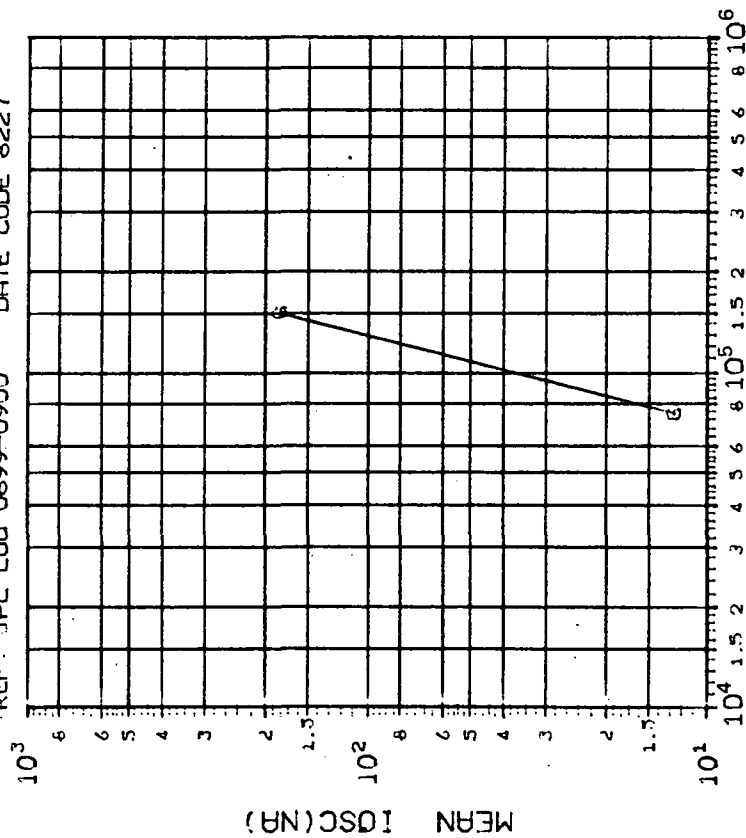
MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0899-0900 DATE CODE 8227



DEVICE TYPE: L161 QUAD COMPARTOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83
REF: JPL LOG 0899-0900 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

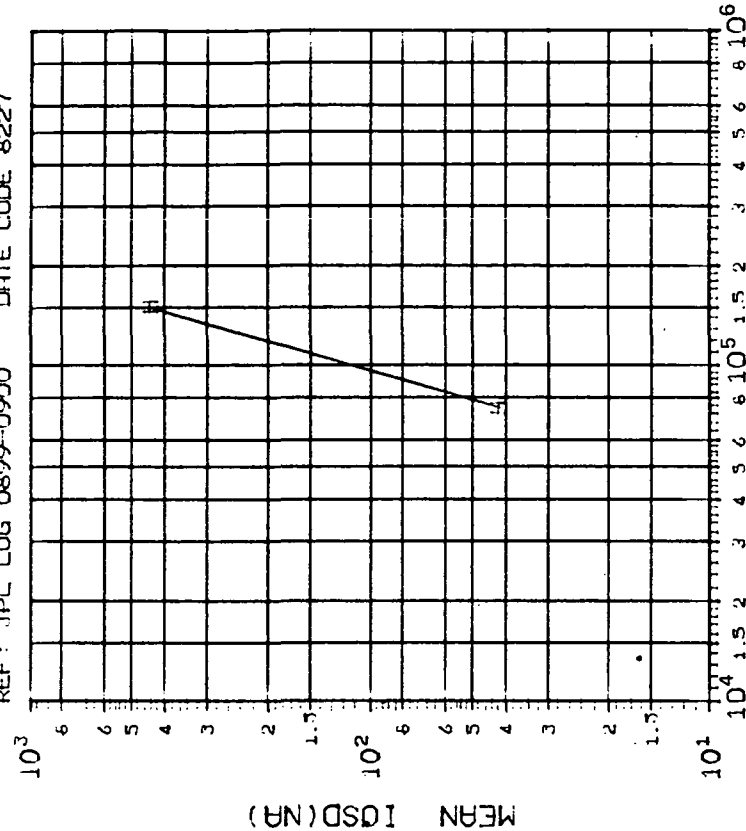
(7) IOSC (V0=0) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------|
| CURVE | DOSE, kilorads(Si) | |
| G | 75 | 300 |
| | 6.512 | 67.60 **** |

INITIAL MEAN VALUE IOSC(NA) = 2.40×10^{-9}

DEVICE TYPE: L161 QUAD COMPARTOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83
REF: JPL LOG 0899-0900 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

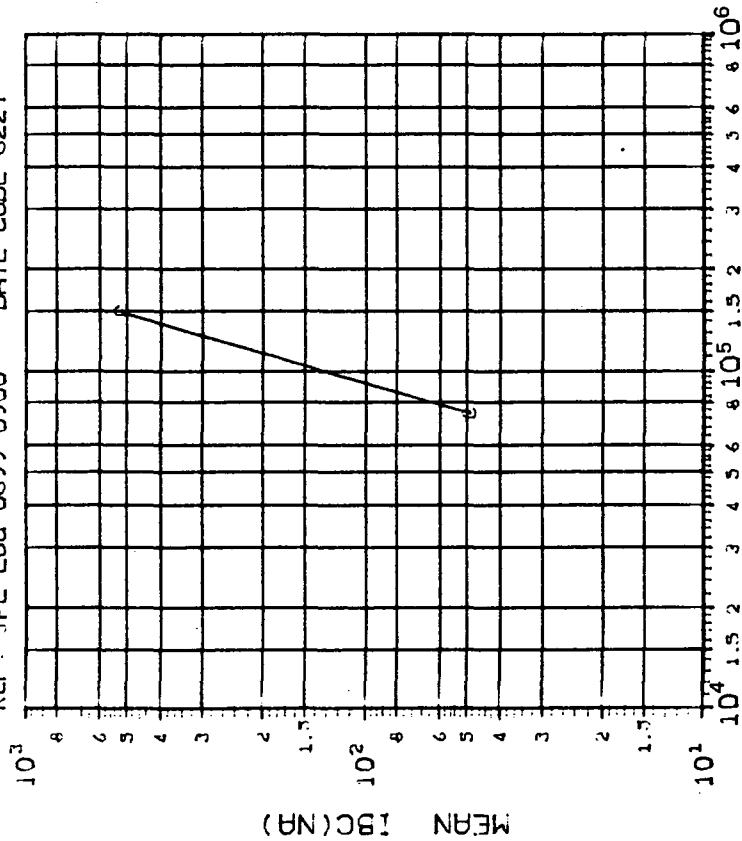
(8) IOSD (V0=0) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------|
| CURVE | DOSE, kilorads(Si) | |
| H | 75 | 300 |
| | 24.99 | 216.1 **** |

INITIAL MEAN VALUE IOSD(NA) = 2.48×10^{-9}

DEVICE TYPE: L161 QUAD COMPARTOR

MFG: SJL 6 DEVICES TEST DATE 02-28-83
REF: JPL LOG 0899-0900 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

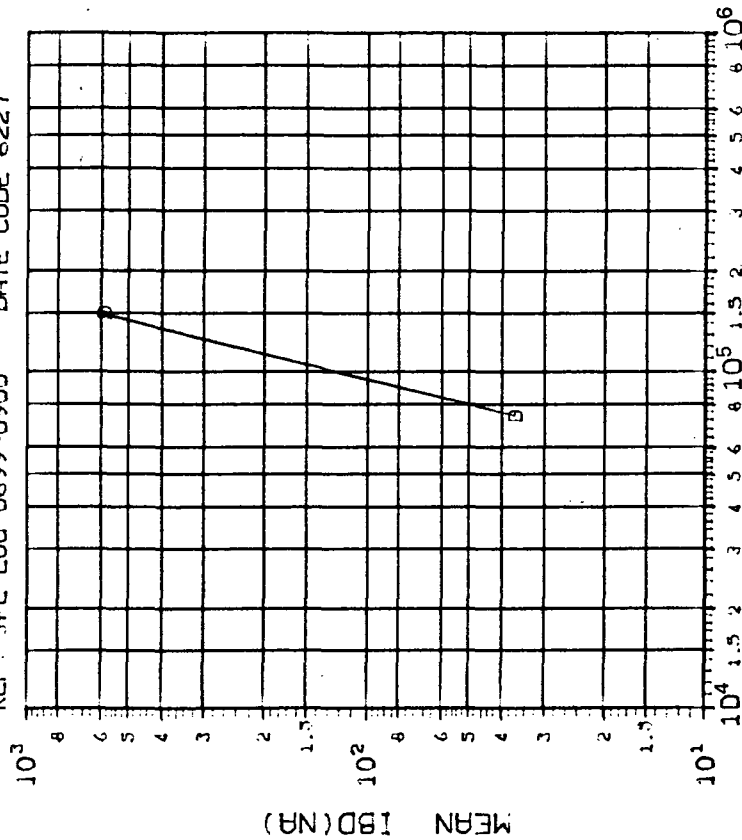
(3) IBC (V0=01) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------|
| CURVE | DOSE, kilorads(Si) | |
| C | 75 | 300 |
| | 36.36 | 290.2 **** |

INITIAL MEAN VALUE IBC(NA) = 3.03×10^{11}

DEVICE TYPE: L161 QUAD COMPARTOR

MFG: SJL 6 DEVICES TEST DATE 02-28-83
REF: JPL LOG 0899-0900 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

(4) IBD (V0=01) IN NA: VS DOSE

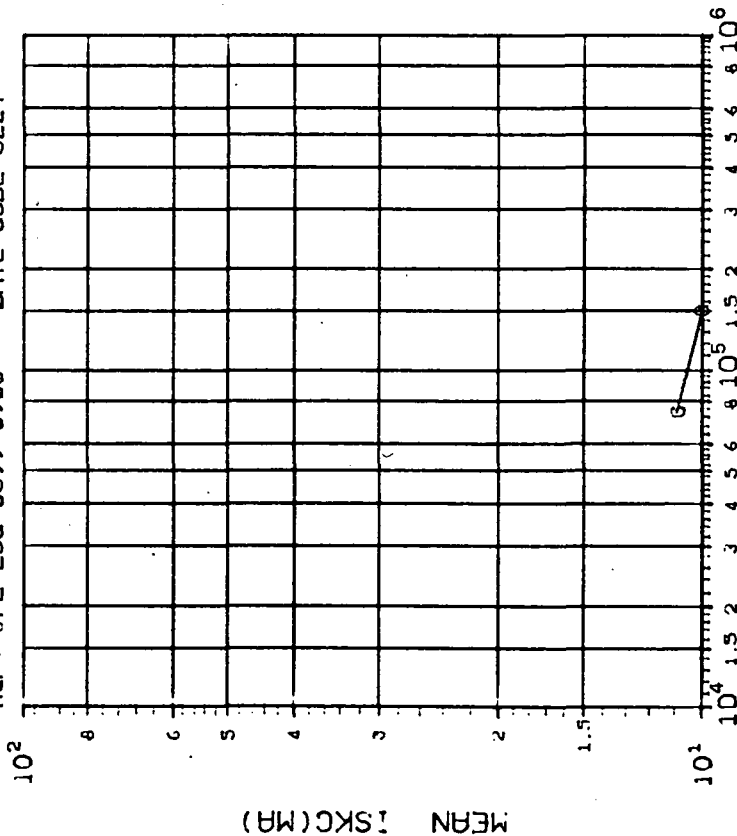
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|------------|
| CURVE | DOSE, kilorads(Si) | |
| D | 75 | 300 |
| | 32.65 | 306.2 **** |

INITIAL MEAN VALUE IBD(NA) = 2.98×10^{11}

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0899-0900 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

(7) ISKC (V0E--V+1.5V, V1N=-100MV) IN VS DOSE

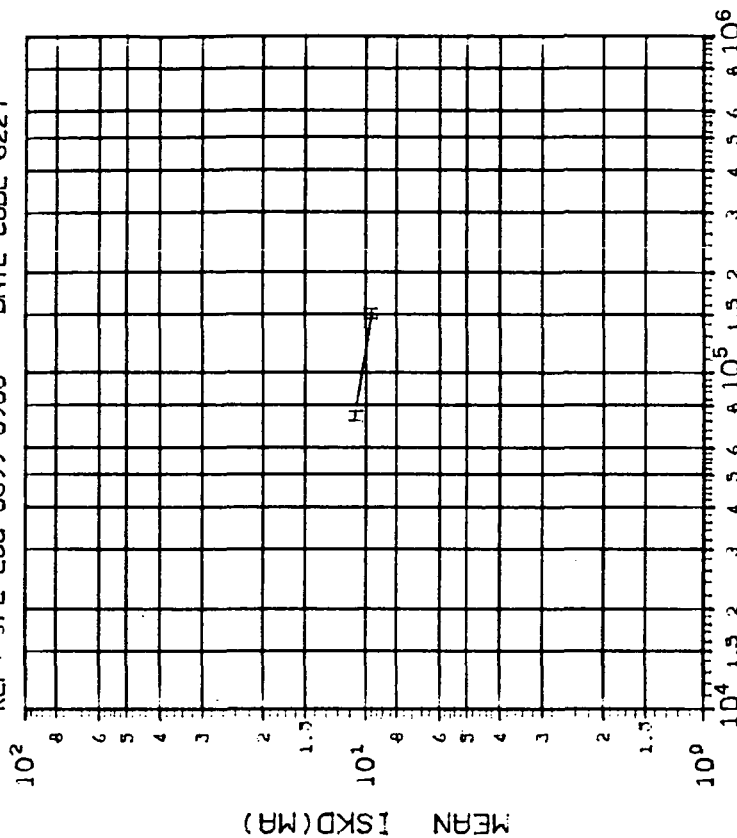
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| G | 75 |
| | 150 |
| | 300 |
| .5964 .7799 **** | |

INITIAL MEAN VALUE ISKC(MA) = $1.21 \times 10^{+1}$

DEVICE TYPE: L161 QUAD COMPARATOR

MFG: SIL 6 DEVICES TEST DATE 02-28-83

REF: JPL LOG 0899-0900 DATE CODE 8227



DOSE, rads(Si) Co⁶⁰ Gammas

(8) ISKD (V0E--V+1.5V, V1N=-100MV) IN VS DOSE

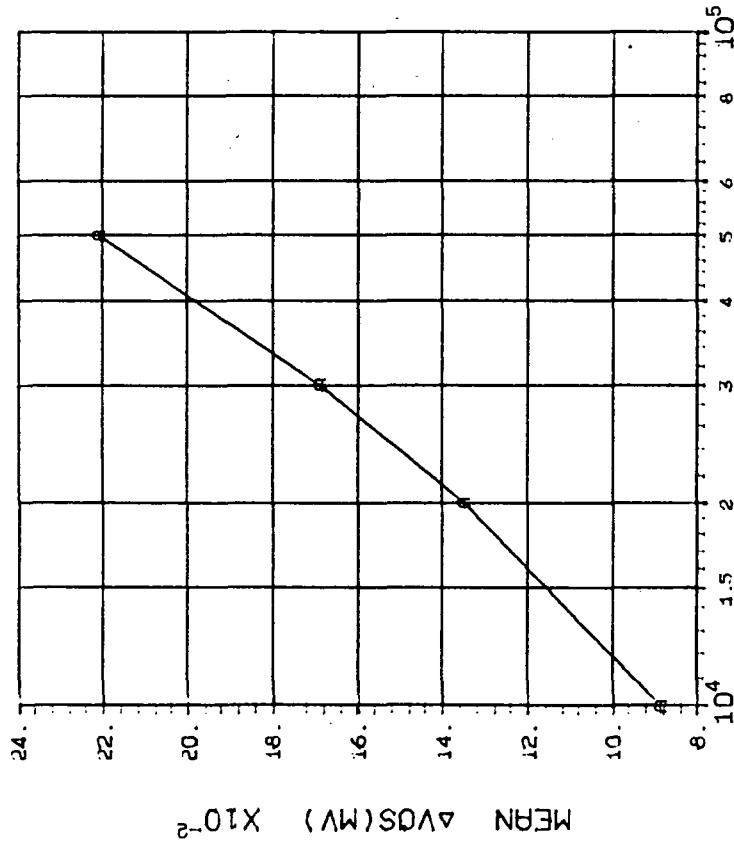
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| H | 75 |
| | 150 |
| | 300 |
| .6274 .7719 **** | |

INITIAL MEAN VALUE ISKD(MA) = $1.18 \times 10^{+1}$

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83

REF: JPL LOG 0933-1 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

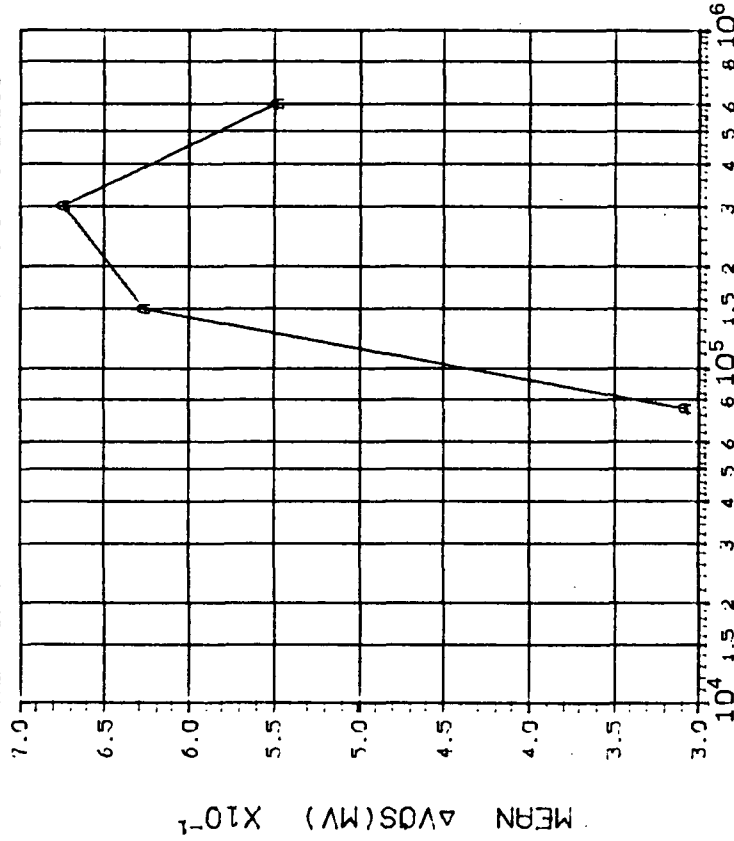
(1) $\Delta V_{DS}(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| A | 10 | 20 |
| | 30 | 50 |
| | | |
| A | .0533 | .0564 .0818 .1594 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83

REF: JPL LOG 0933-2 DATE CODE L8133



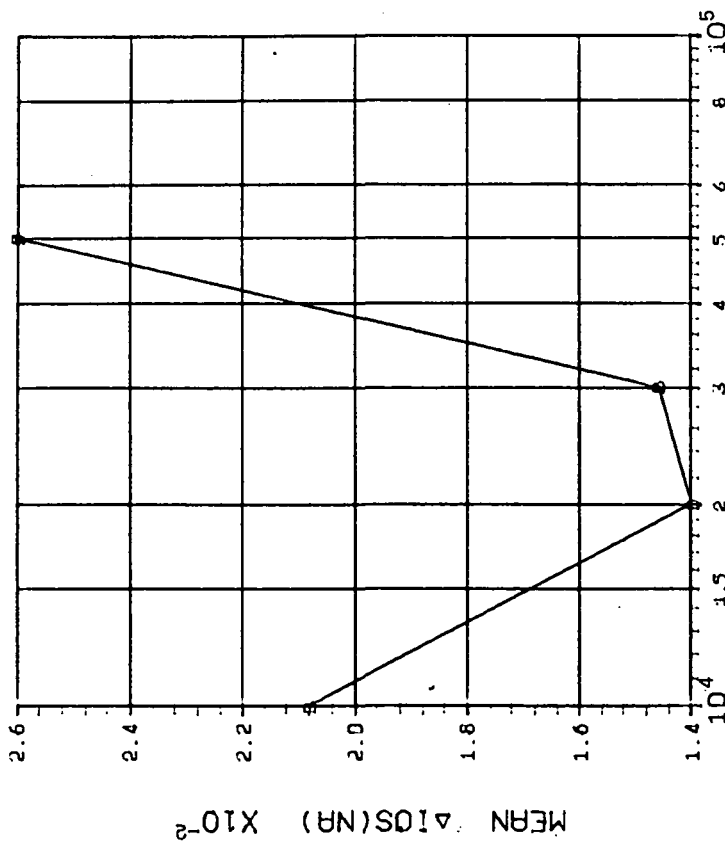
DOSE, rads(Si) Co 60 Gammas

(1) $\Delta V_{DS}(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| A | 75 | 150 |
| | 300 | 600 |
| | | |
| A | .1848 | .2634 .2301 .1793 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83
REF: JPL LOG 0933-1 DATE CODE L6133



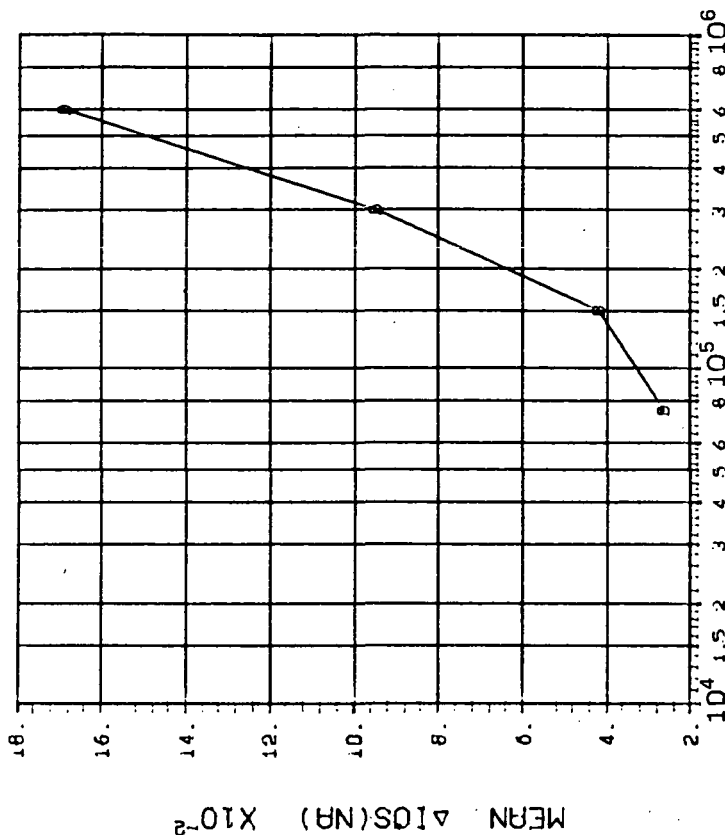
DOSE, rads(Si) Co 60 Gammas

(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | .0162 | .0098 .0113 .0285 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83
REF: JPL LOG 0933-2 DATE CODE L6133



DOSE, rads(Si) Co 60 Gammas

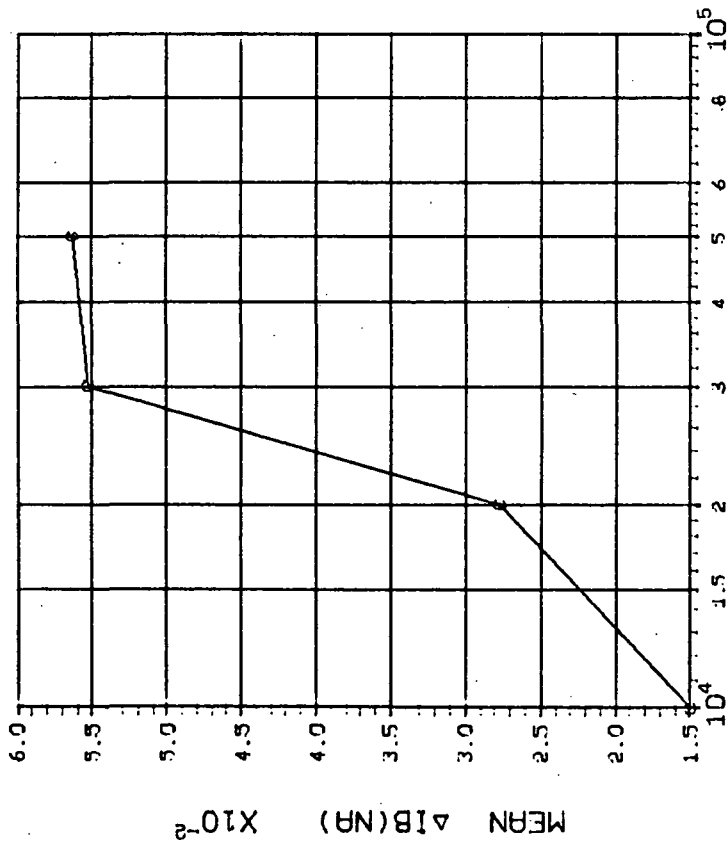
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| B | .0251 | .0664 .1256 .2252 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 3 DEVICES TEST DATE 04-08-83

REF: JPL LOG 0933-1 DATE CODE L8133



DOSE, rads(Si) Co⁶⁰ Gammas

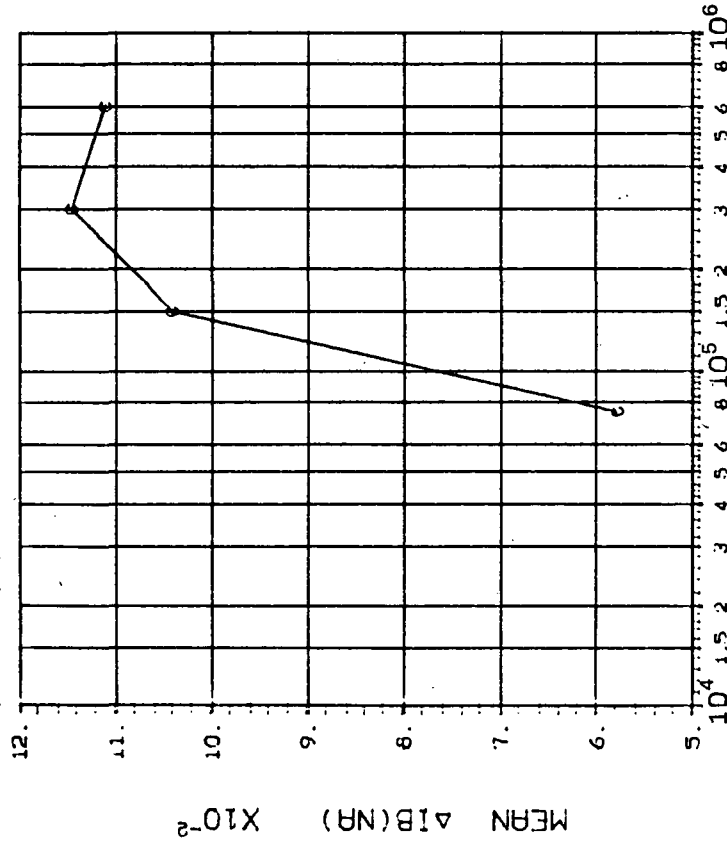
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 10 | 20 |
| | .1007 | .1455 |
| | 30 | 50 |
| | .1869 | .2682 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83

REF: JPL LOG 0933-2 DATE CODE L8133



DOSE, rads(Si) Co⁶⁰ Gammas

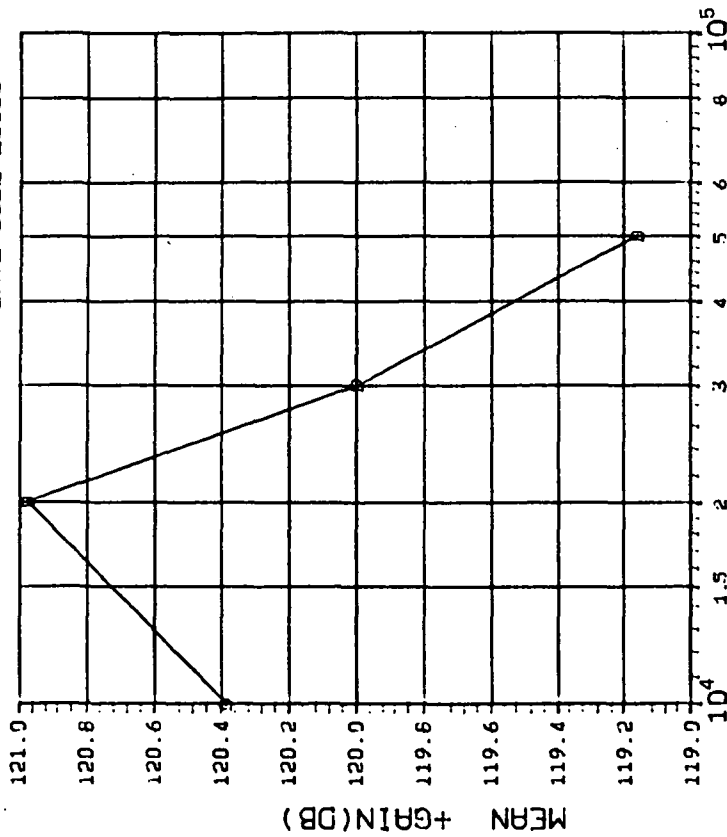
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 75 | 150 |
| | .3690 | .7219 |
| | 300 | 600 |
| | .5750 | .7525 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83

REF: JPL LOG 0933-1 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

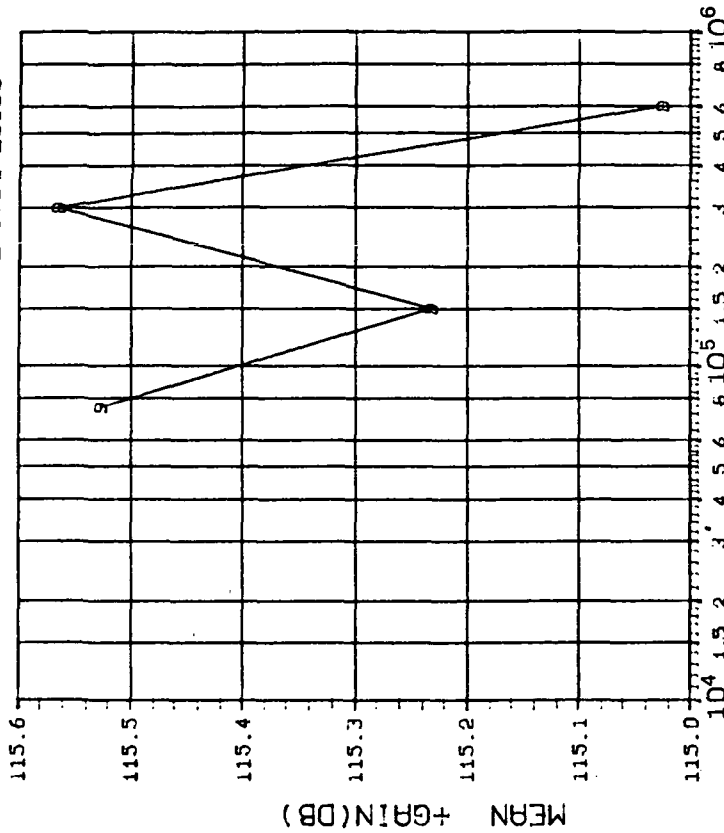
(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

INITIAL MEAN VALUE +GAIN(DB) = 1.19×10^{12}

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83

REF: JPL LOG 0933-2 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

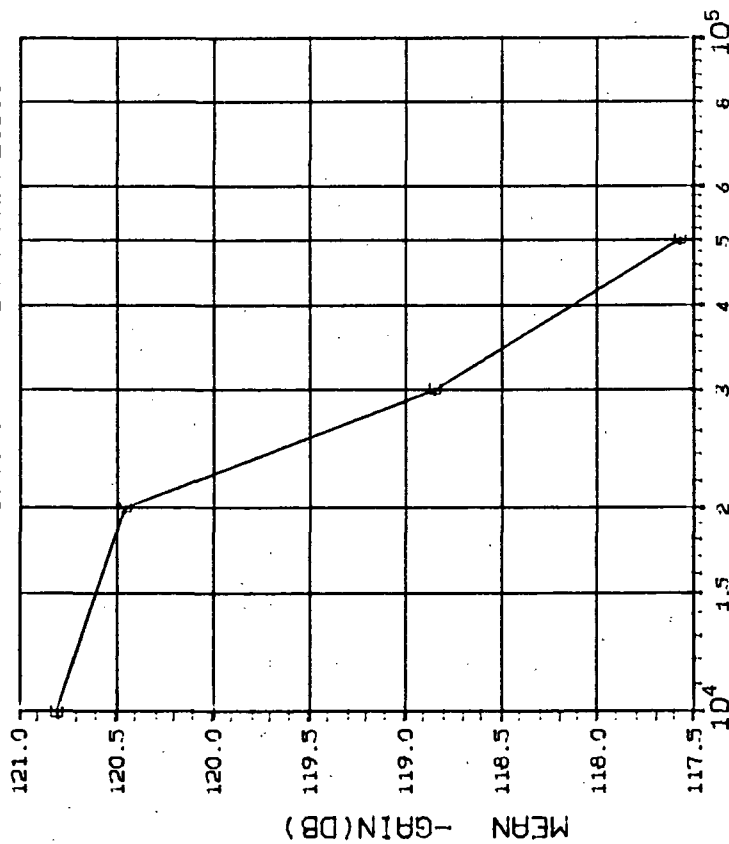
INITIAL MEAN VALUE +GAIN(DB) = 1.19×10^{12}

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|---------------|--------------------|------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) | |
| D | 1.00 | 75 | 150 |
| | | 150 | 300 |
| | | 300 | 600 |
| | | 600 | 1200 |

INITIAL MEAN VALUE +GAIN(DB) = 1.19×10^{12}

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83
REF: JPL LOG 0933-1 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

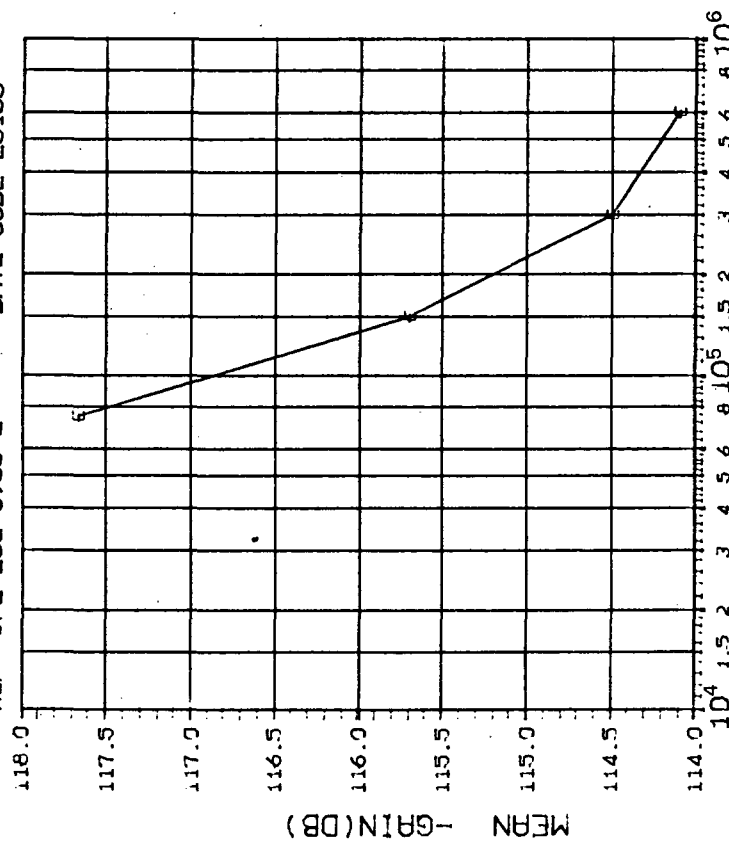
(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 3.793 3.333 4.032 2.310 |

INITIAL MEAN VALUE -GAIN(DB) = 1.22X10⁺²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-08-83
REF: JPL LOG 0933-2 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

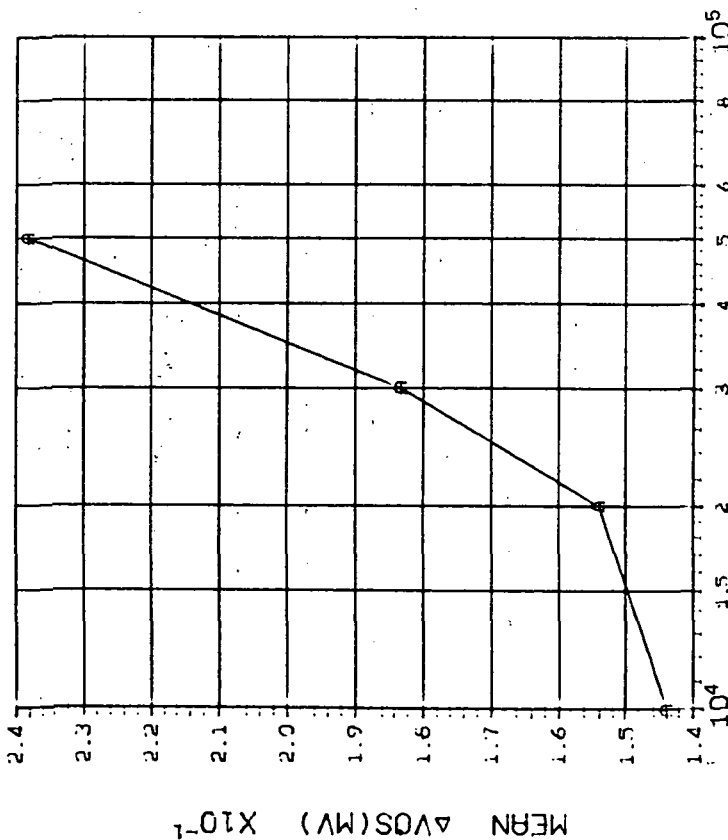
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 3.586 2.702 1.268 2.055 |

INITIAL MEAN VALUE -GAIN(DB) = 1.22X10⁺²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0934-1 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

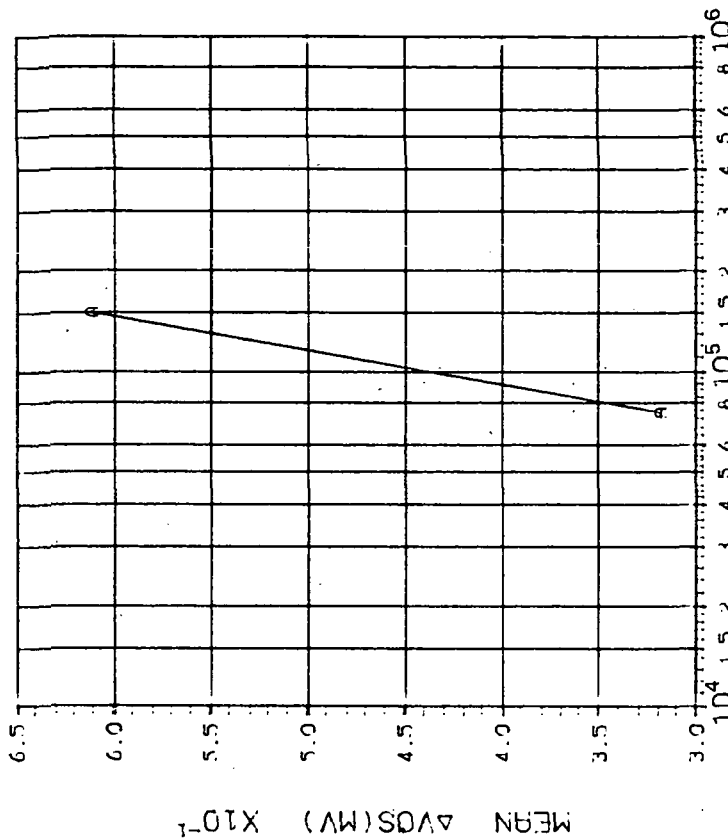
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .1807 | .1618 .1796 .1946 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0934-2 DATE CODE L8133



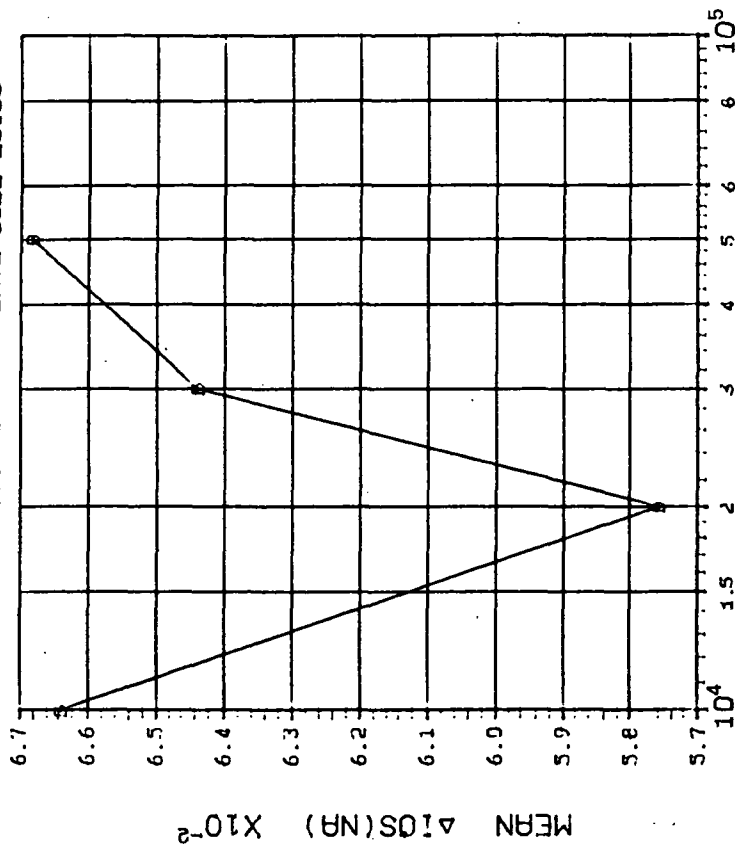
DOSE, rads(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .2470 | .2347 ***** |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83
REF: JPL LOG 0934-1 DATE CODE L8133



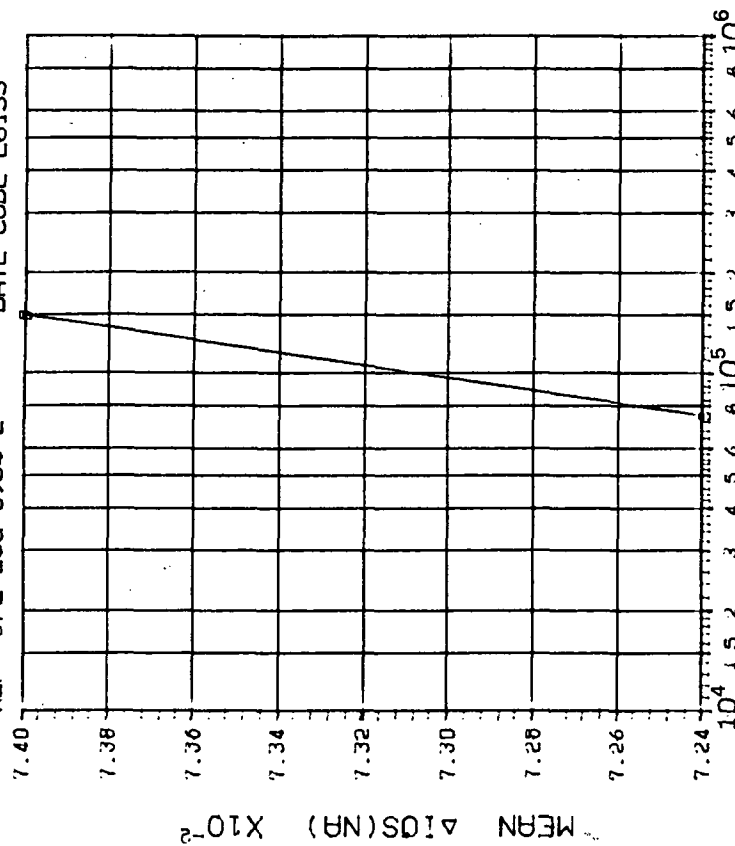
DOSE, rads(Si) Co 60 Gammas

(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | .0724 | .0535 .0724 .0657 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83
REF: JPL LOG 0934-2 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

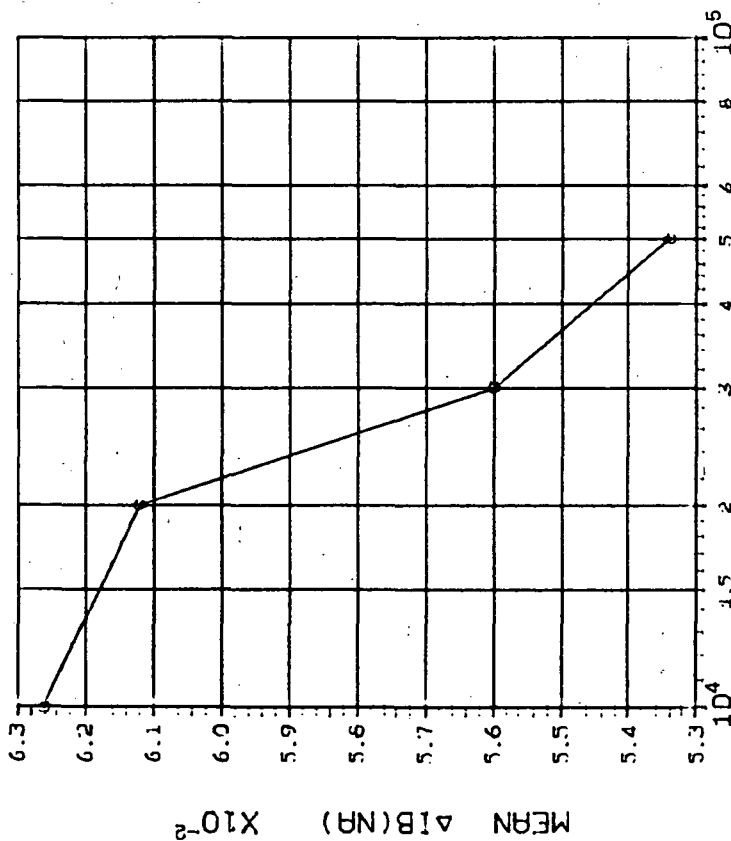
(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| B | .0688 | .0675 ***** |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0934-1 DATE CODE L8133



DOSE, rads(Si) Co 60 Gammas

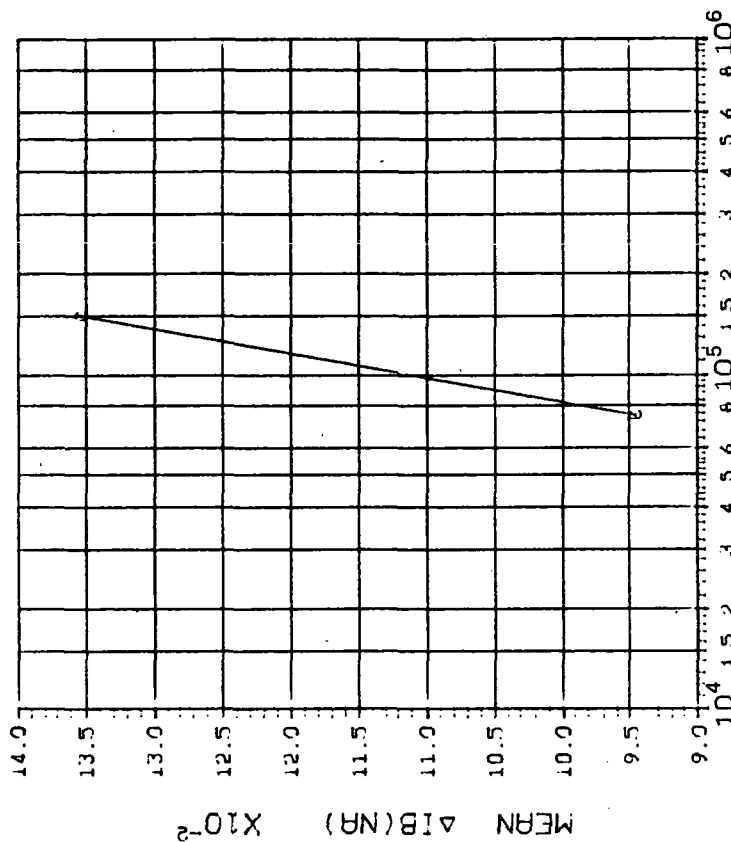
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 20 30 50 |
| | .1232 .1441 .1789 .2603 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0934-2 DATE CODE L8133



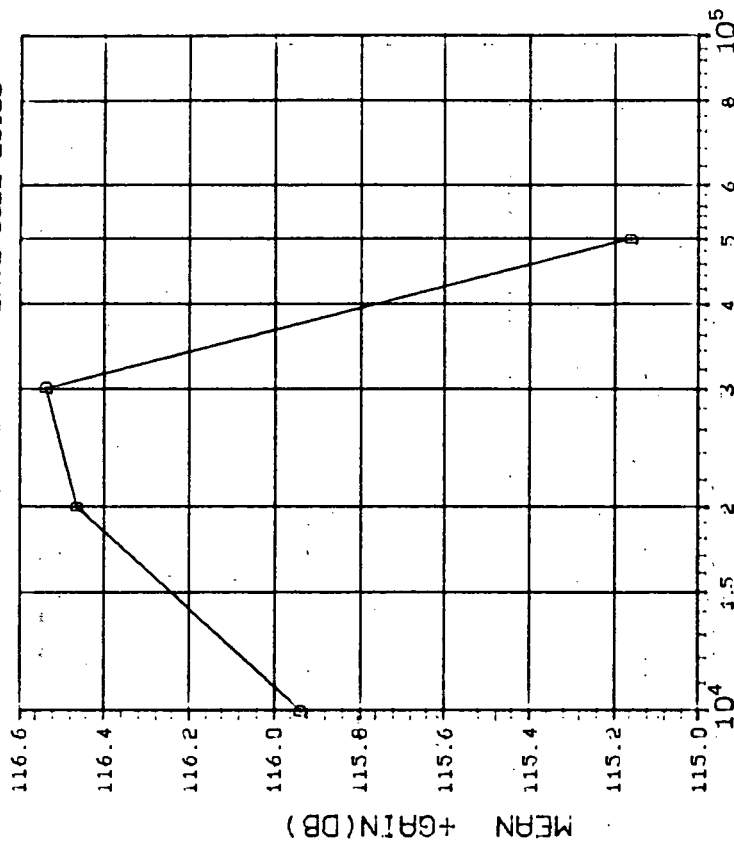
DOSE, rads(Si) Co 60 Gammas

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 150 300 600 |
| | .3365 .6020 ***** ***** |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83
REF: JPL LOG 0934-1 DATE CODE L8133



DOSE, rads(Si) Co⁶⁰ Gammas

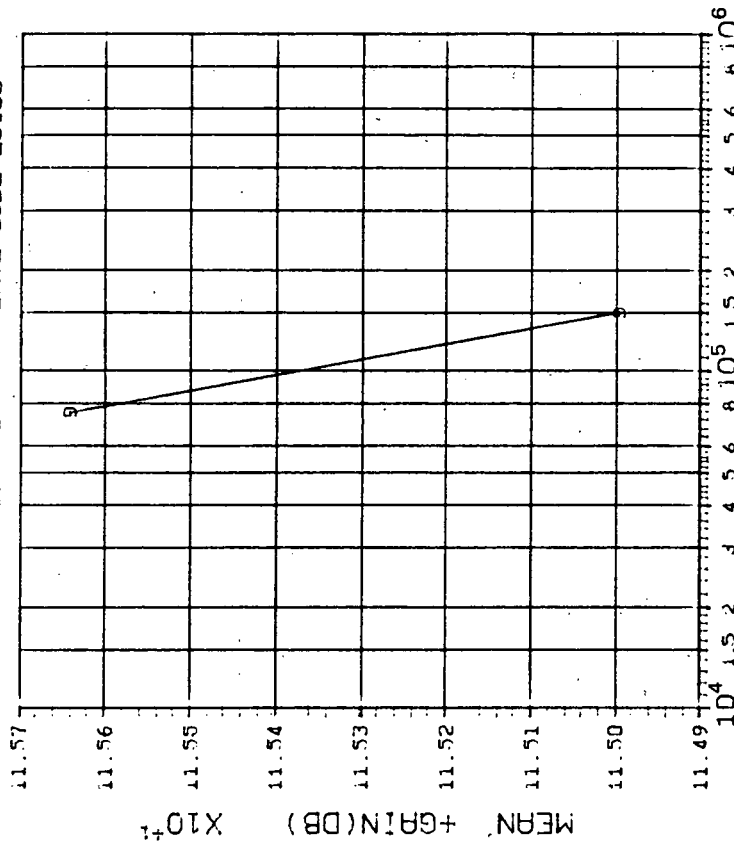
(4)+GAIN IN DB(1 MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 10 20 30 50 |
| | | 1.685 2.226 2.553 2.426 |

INITIAL MEAN VALUE +GAIN(DB) = 1.17X10⁺²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 5 DEVICES TEST DATE 04-11-83
REF: JPL LOG 0934-2 DATE CODE L8133



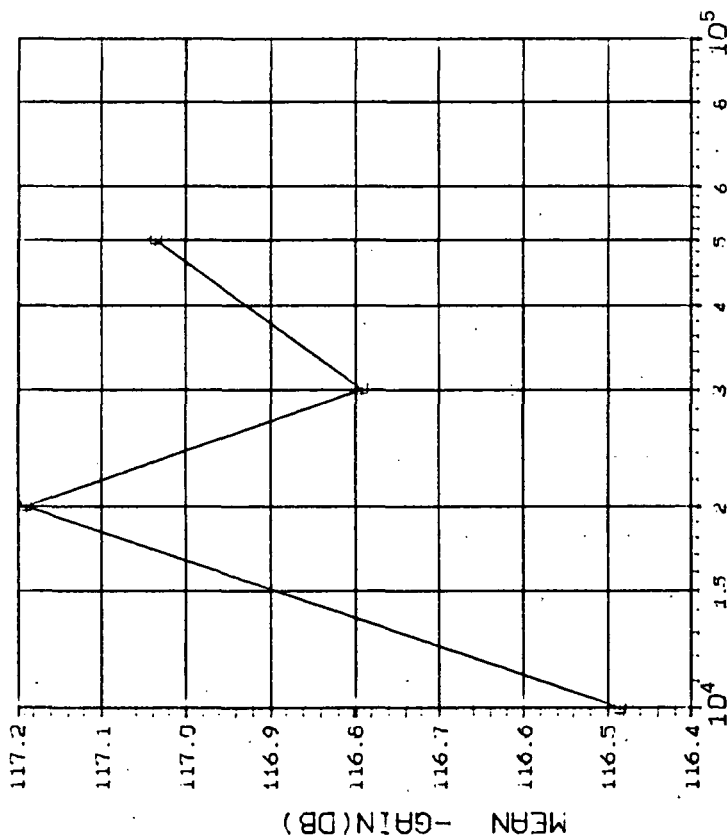
DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN IN DB(1 MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 600 |
| | | 1.629 1.487 ***** |

INITIAL MEAN VALUE +GAIN(DB) = 1.17X10⁺²

DEVICE TYPE: LF155 FET OP AMP
 MFG: MOT 5 DEVICES TEST DATE 04-11-83
 REF: JPL LOG 0934-1 DATE CODE L8133



DOSE, rads(Si) Co⁶⁰ Gammas
 (5)-GAIN IN DB(1 MA LOAD, -10V) : VS DOSE

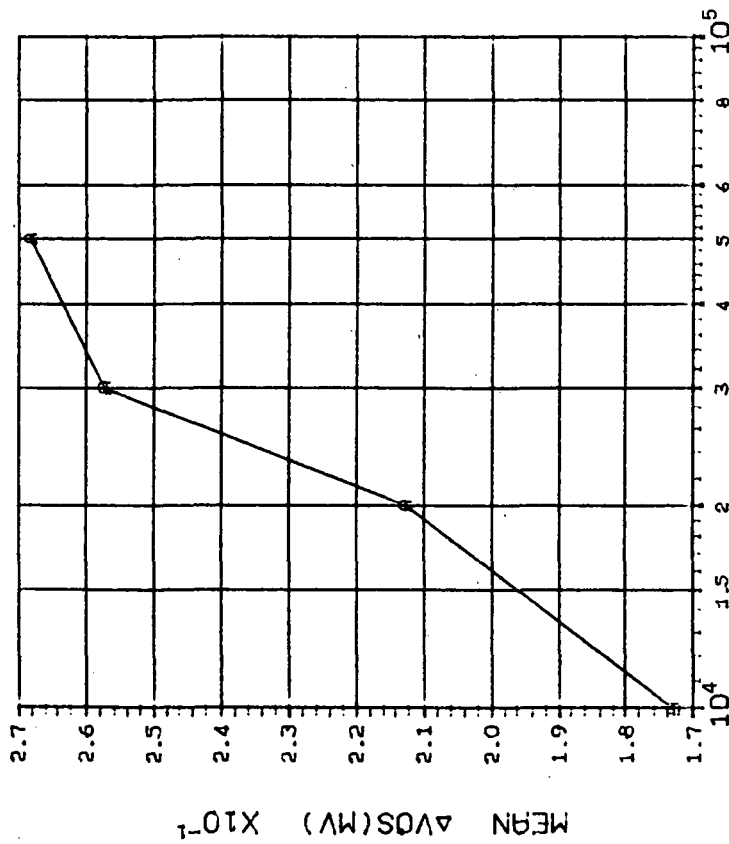
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | 1 _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 |
| | 2.319 | 20 |
| | 3.090 | 30 |
| | | 50 |
| | | 3.161 |

INITIAL MEAN VALUE -GAIN(DB) = 1.18X10⁺²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 05-20-83

REF: JPL LOG 0935-1 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

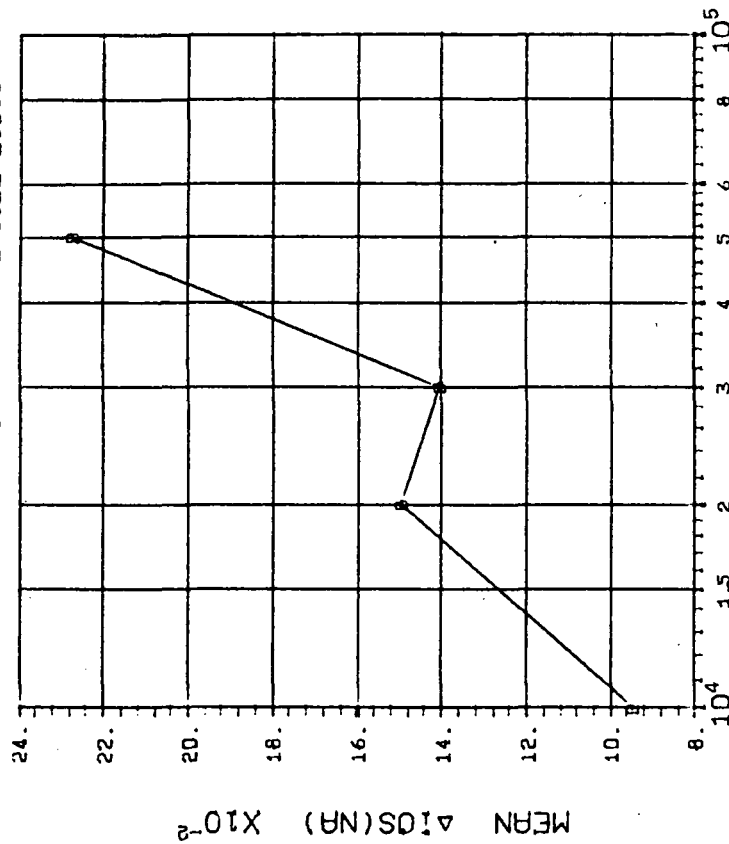
(1) $\Delta VOS(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| A | .1790 | .2063 | .3107 | .3467 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 05-20-83

REF: JPL LOG 0935-1 DATE CODE L8133

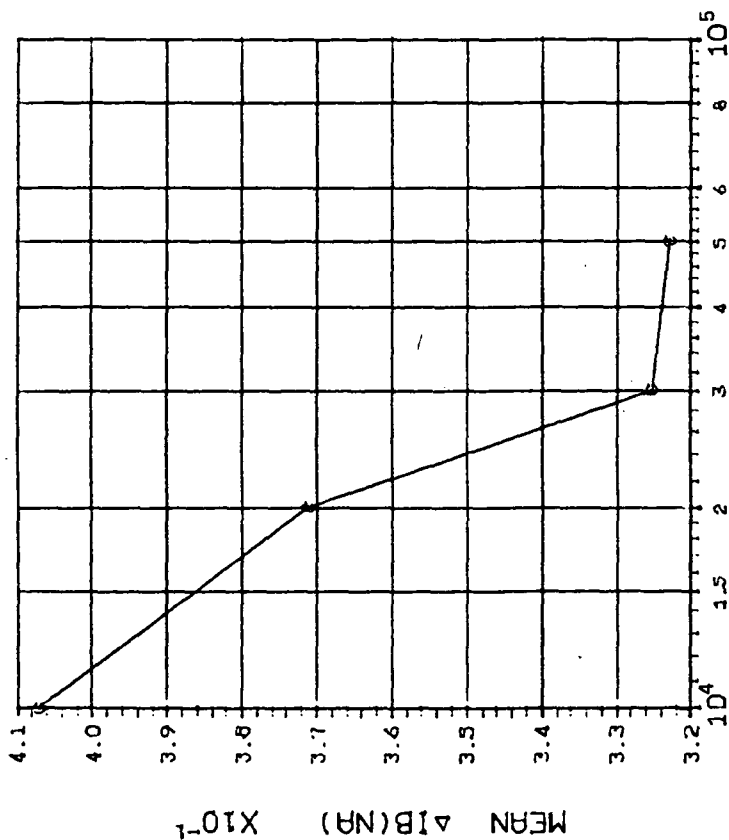


DOSE, rads(Si) 2.5 MeV electrons

(2) $\Delta IOS(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| B | .0962 | .1537 | .1559 | .2752 |

DEVICE TYPE: LF155 FET OP AMP
 MFG: MOT 4 DEVICES TEST DATE 05-20-83
 REF: JPL LOG 0935-1 DATE CODE L8133



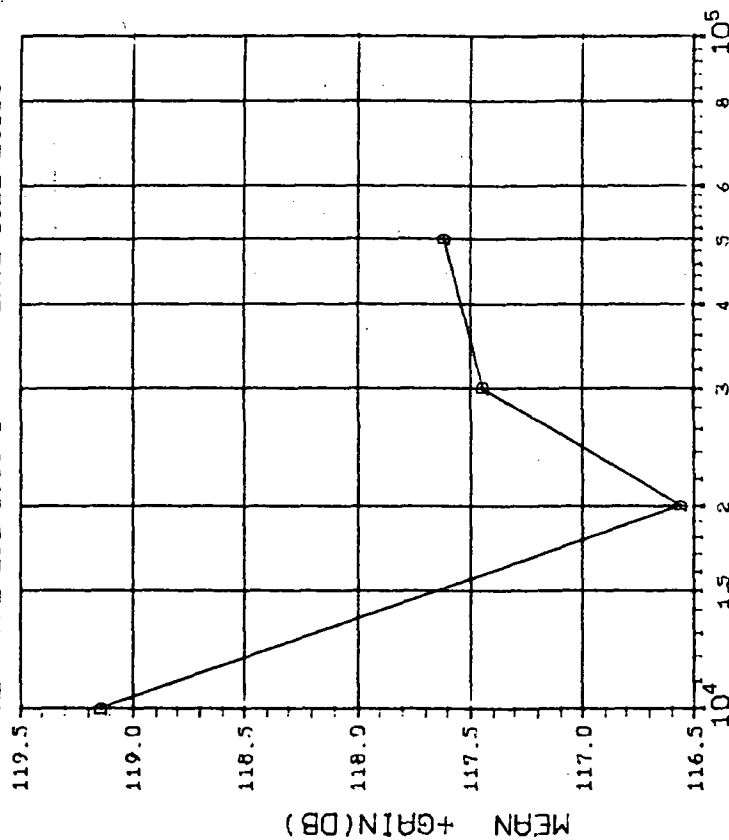
DOSE, rads(Si) 2.5 MeV electrons

(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .8384 | .9538 1.070 1.139 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MDT 4 DEVICES TEST DATE 05-20-83
REF: JPL LOG 0935-1 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

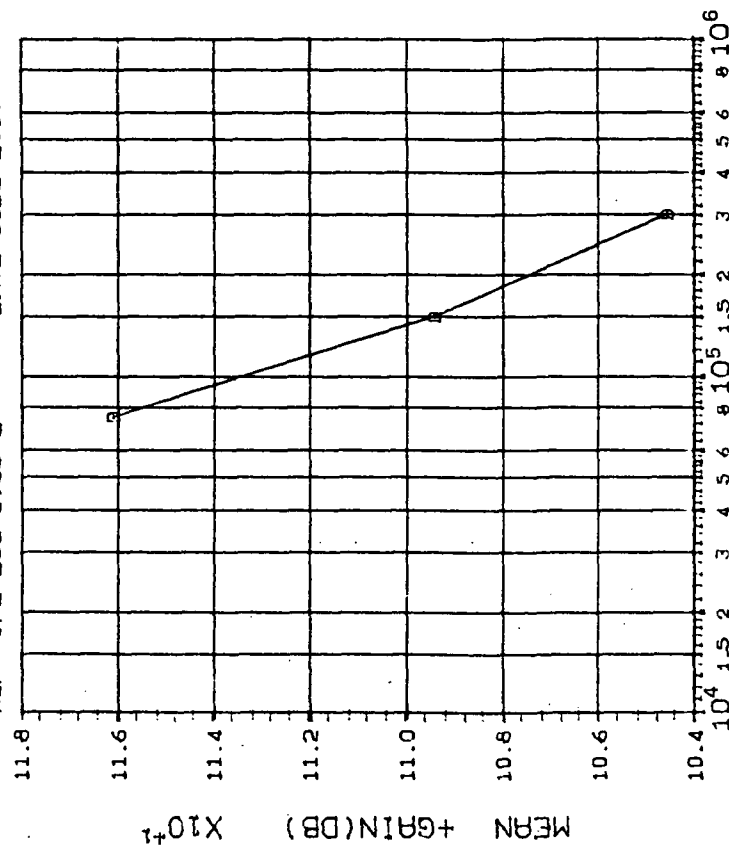
(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 1.913 3.077 3.516 6.516 |

INITIAL MEAN VALUE +GAIN(DB) = 1.19X10¹²

DEVICE TYPE: LF155 FET OP AMP

MFG: MDT 4 DEVICES TEST DATE 05-20-83
REF: JPL LOG 0935-2 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

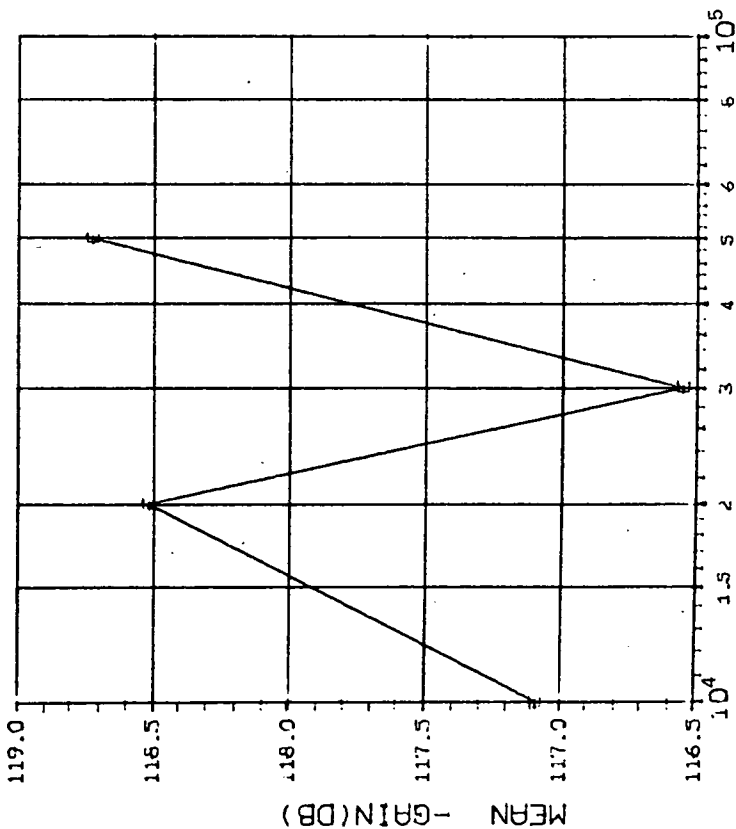
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 6.767 10.31 18.92 **** |

INITIAL MEAN VALUE +GAIN(DB) = 1.19X10¹²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 05-20-83

REF: JPL LOG 0935-1 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

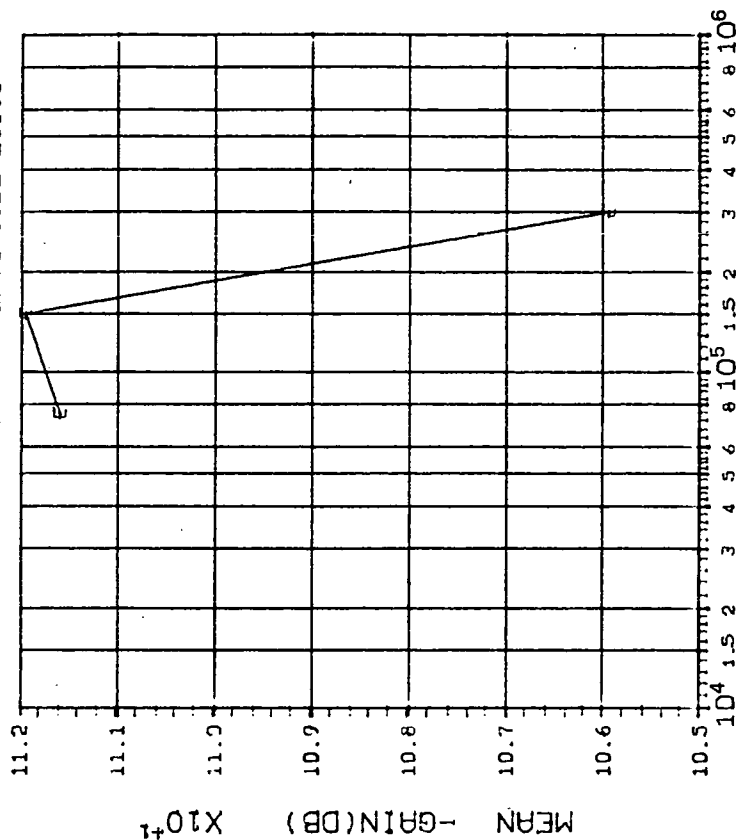
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 2.009 1.505 1.321 1.673 |

INITIAL MEAN VALUE -GAIN(DB) = 1.20X10¹²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 05-20-83

REF: JPL LOG 0935-2 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

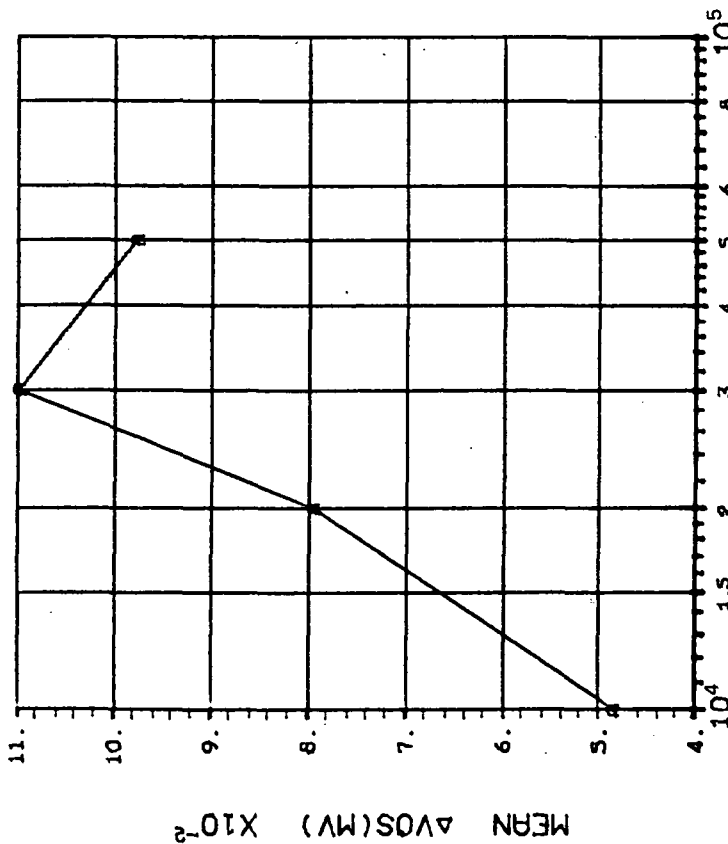
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 |

INITIAL MEAN VALUE -GAIN(DB) = 1.20X10¹²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-1 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(1) $\Delta VOS(MV)$: VS DOSE

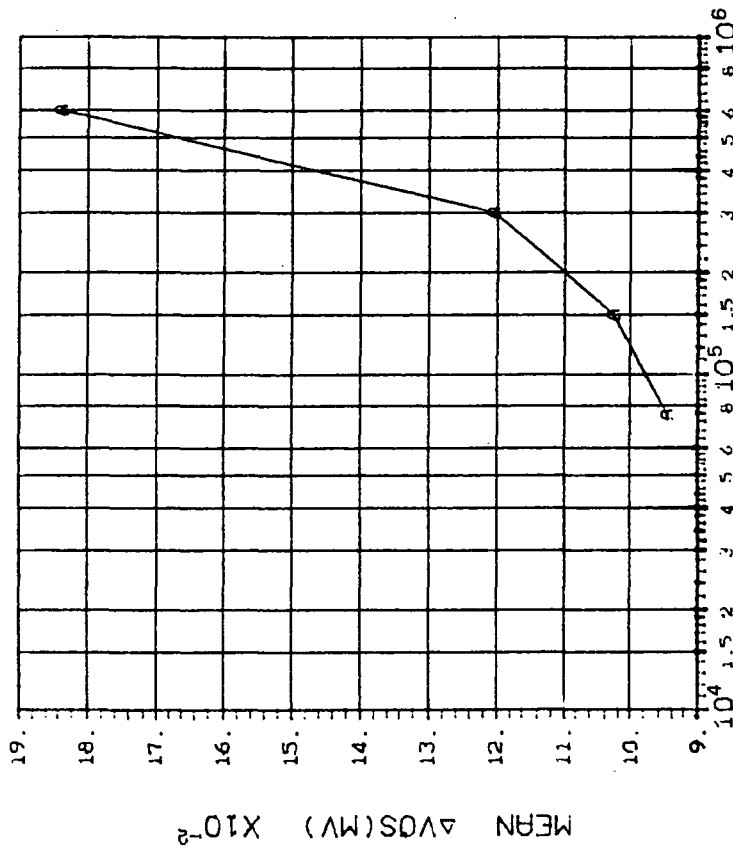
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 10 20 30 50 |
| | .0390 .0968 .1149 .1314 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-2 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(1) $\Delta VOS(MV)$: VS DOSE

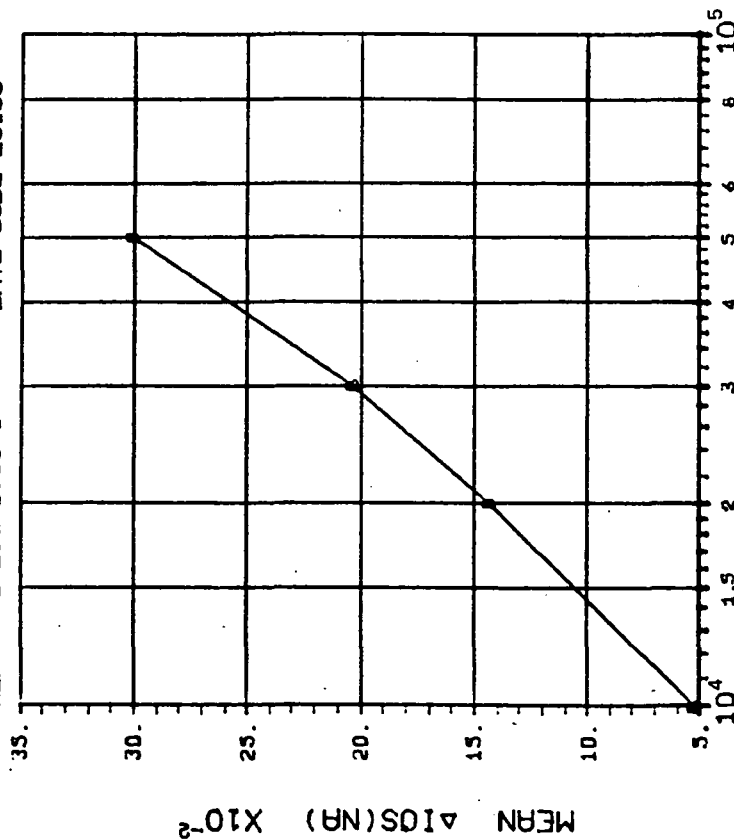
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 75 150 300 600 |
| | .1395 .1450 .1314 .1150 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

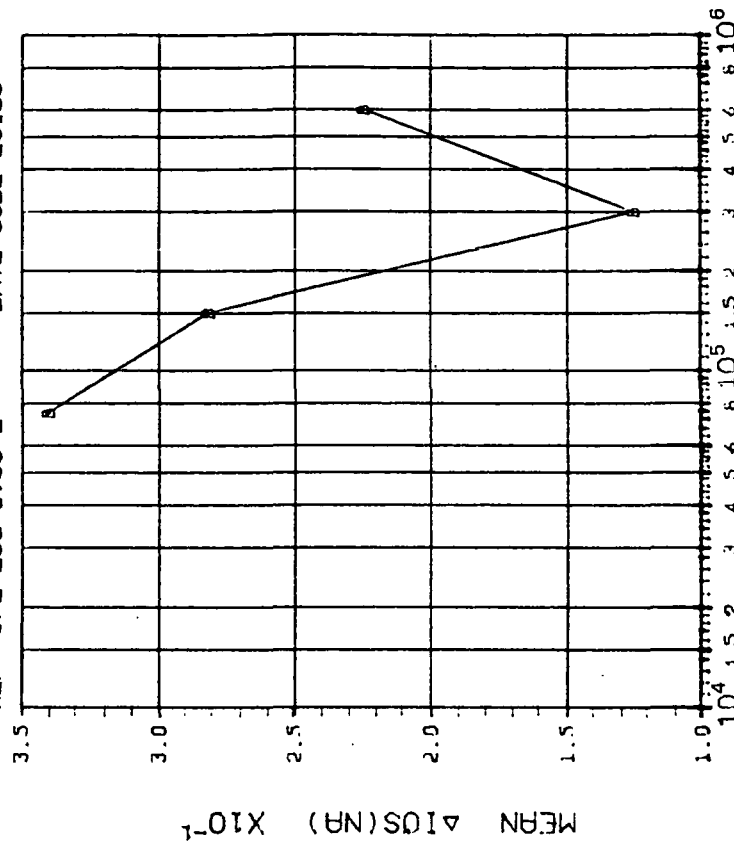
REF: JPL LOG 0936-1 DATE CODE L8133



DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

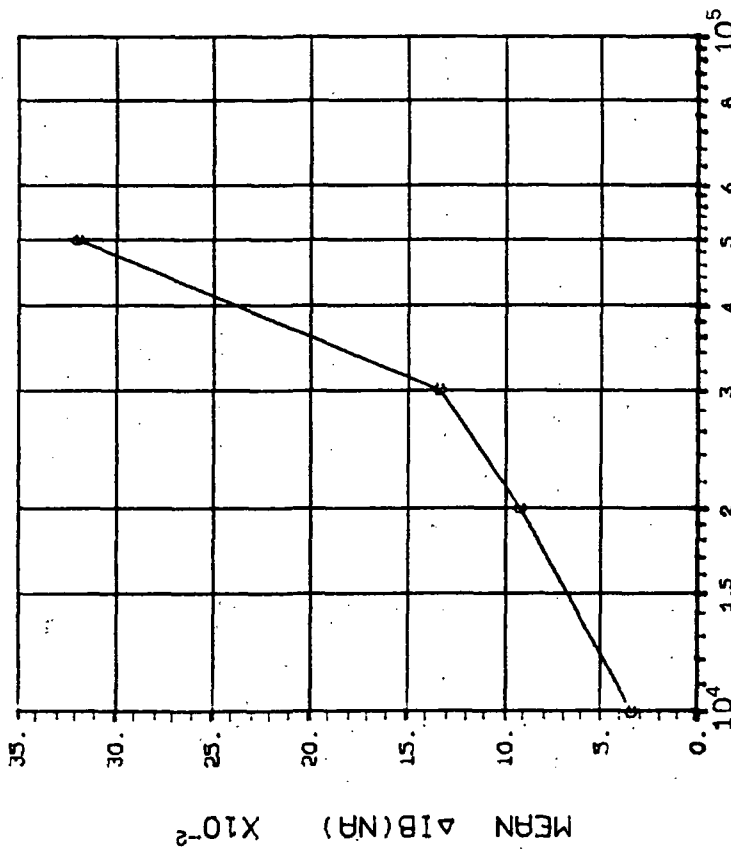
REF: JPL LOG 0936-2 DATE CODE L8133



DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-1 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

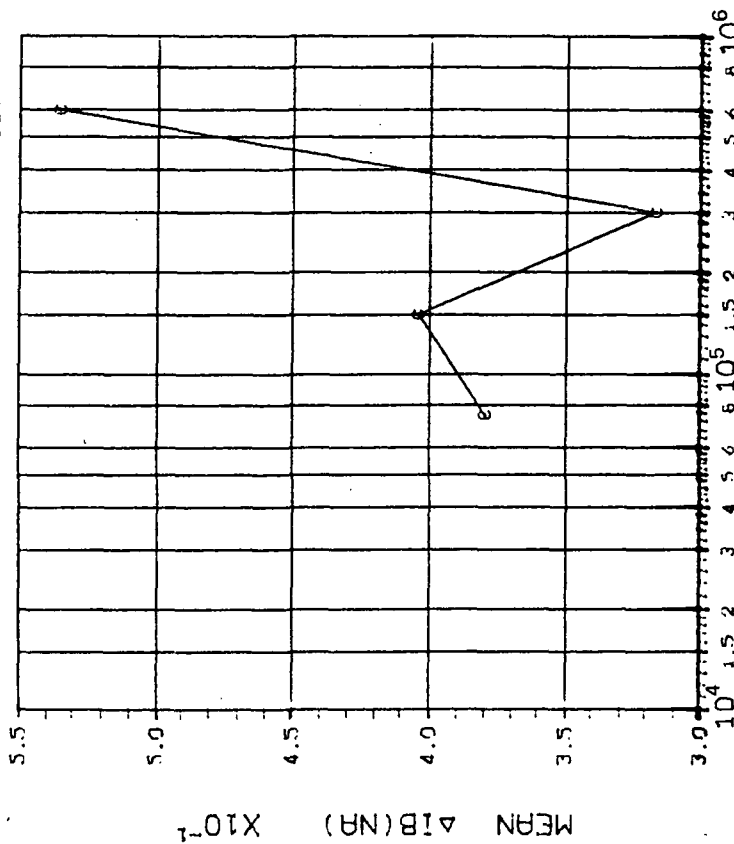
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .0719 | .1639 .2312 .4298 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-2 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

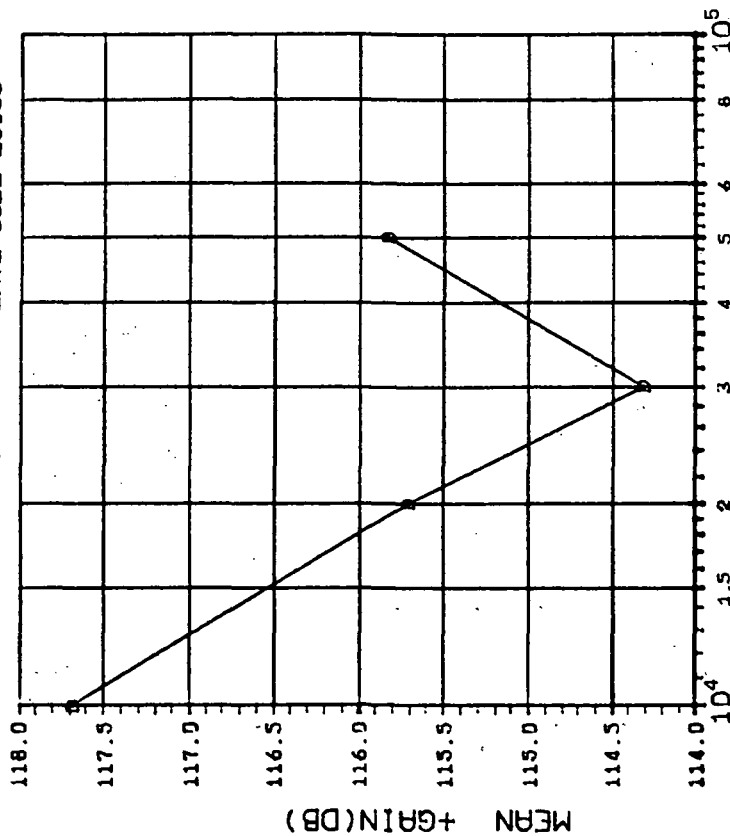
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| C | .5156 | .6178 .6491 1.122 |

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-1 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(41)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

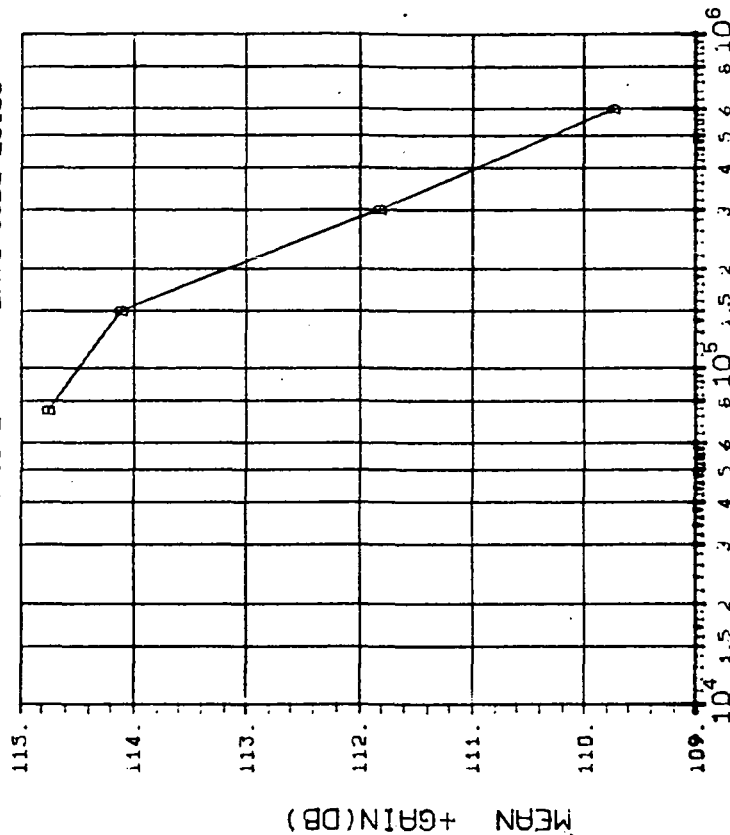
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 5.539 4.332 4.751 5.684 |

INITIAL MEAN VALUE +GAIN(DB) = 1.19X10⁺²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-2 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

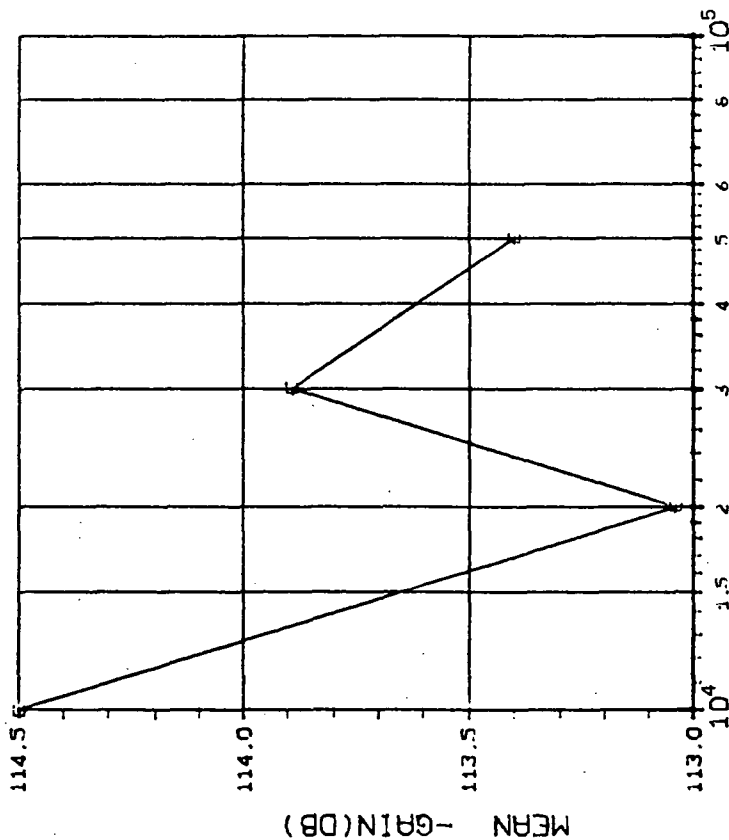
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 6.070 5.937 4.314 5.040 |

INITIAL MEAN VALUE +GAIN(DB) = 1.19X10⁺²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-1 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

(51)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

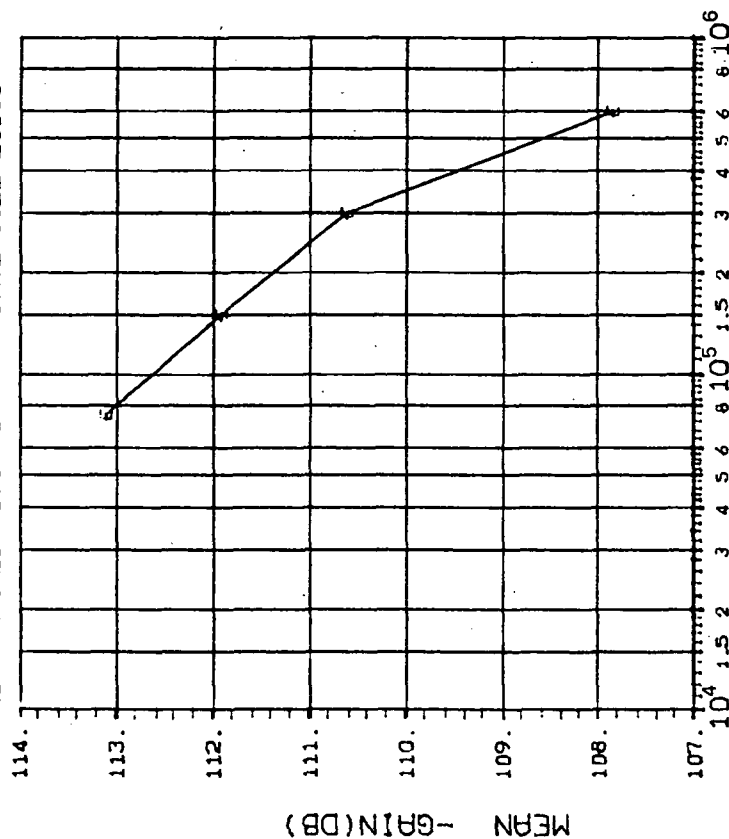
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 4.020 3.787 4.765 6.358 |

INITIAL MEAN VALUE -GAIN(DB) = 1.16X10¹²

DEVICE TYPE: LF155 FET OP AMP

MFG: MOT 4 DEVICES TEST DATE 04-11-83

REF: JPL LOG 0936-2 DATE CODE L8133



DOSE, rads(Si) 2.5 MeV electrons

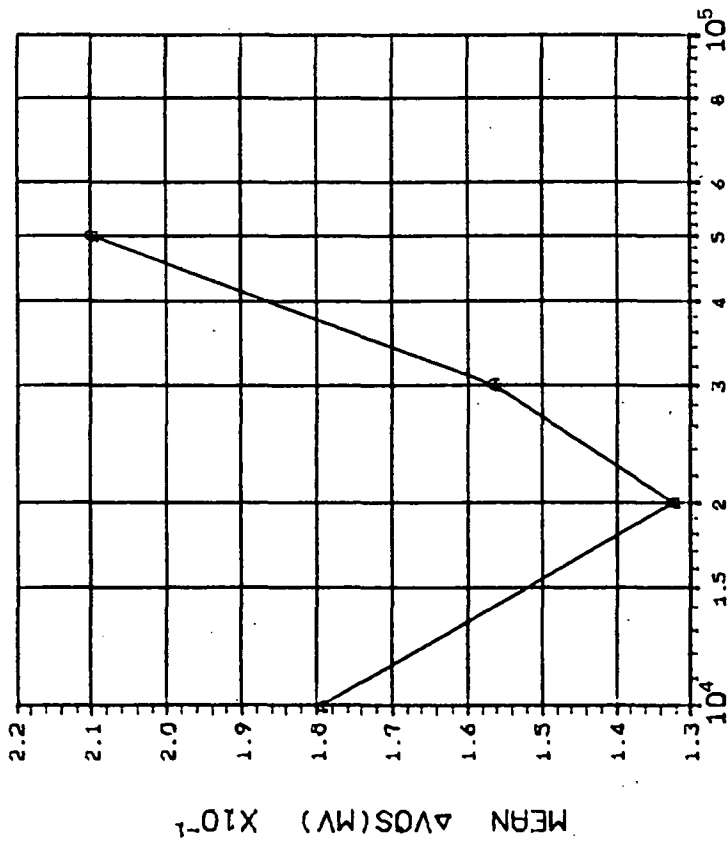
(51)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 4.998 6.027 5.850 6.478 |

INITIAL MEAN VALUE -GAIN(DB) = 1.16X10¹²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 10-19-82
REF: JPL LOG 0864-1 DATE CODE 139C



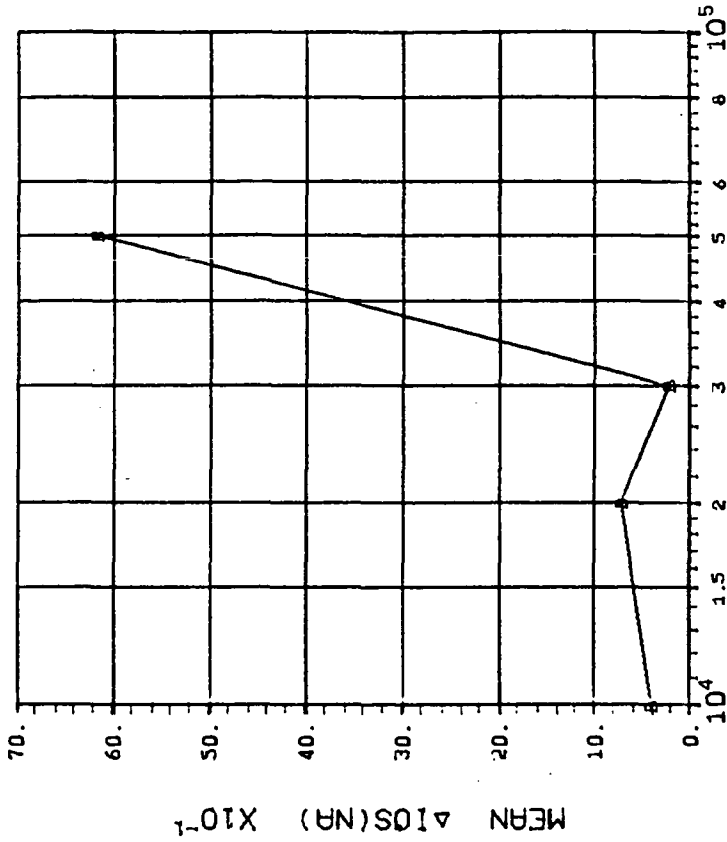
DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .1660 | .1286 .1555 .1948 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 10-19-82
REF: JPL LOG 0864-1 DATE CODE 139C



DOSE, rads(Si) 2.5 MeV electrons

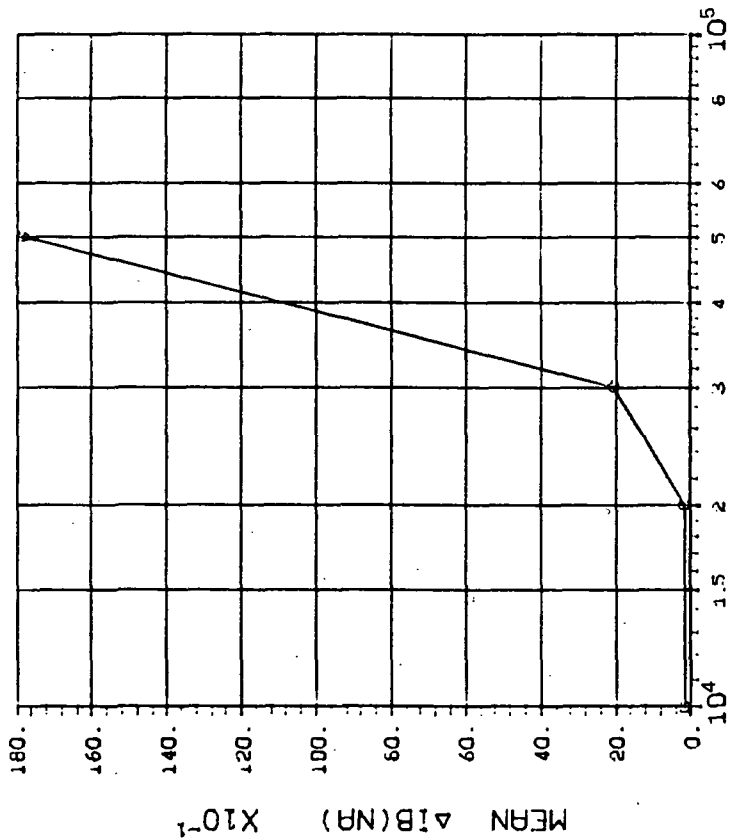
(2)ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | .7682 | 1.542 .3067 9.191 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-07-83

REF: JPL LOG 0864-1 DATE CODE 139C



DOSE, rads(Si) 2.5 MeV electrons

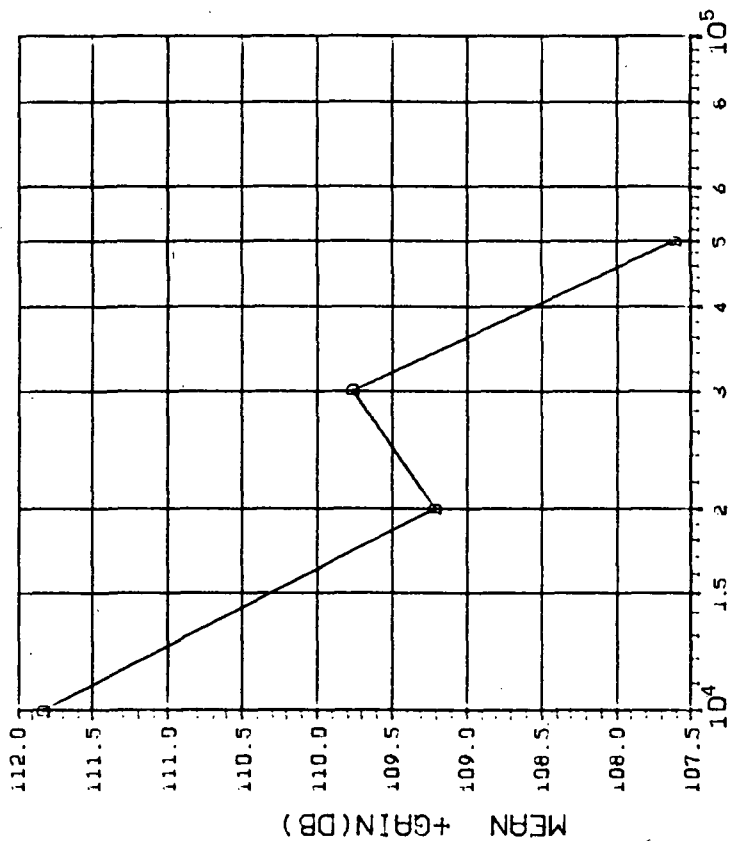
(3) ΔIB (nA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .3320 | .7308 1.968 6.871 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-07-83

REF: JPL LOG 0864-1 DATE CODE 139C



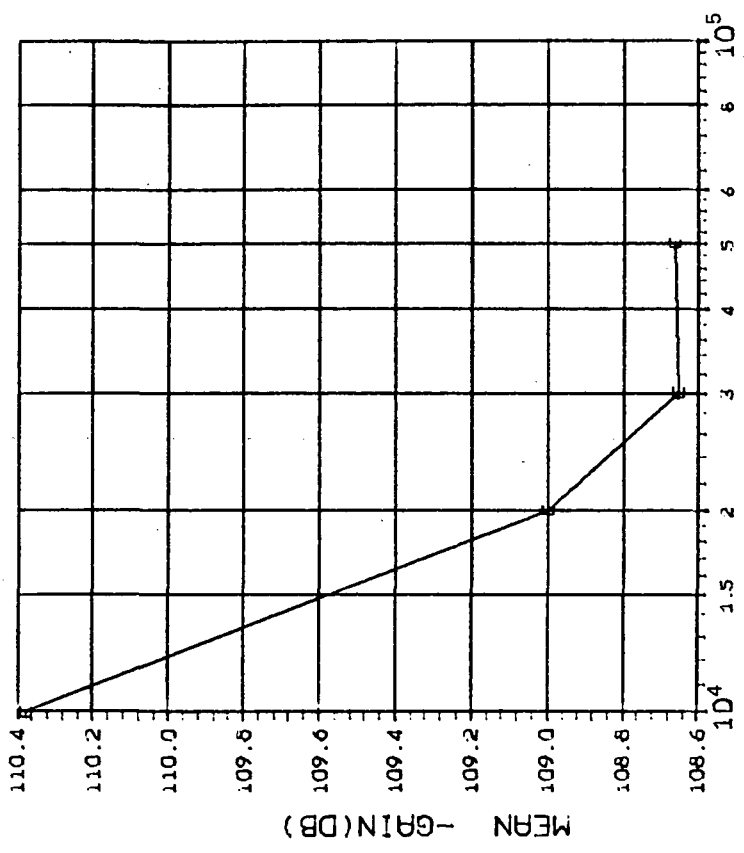
DOSE, rads(Si) 2.5 MeV electrons

(4) +GAIN IN DB(1 MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| D | 1.00 | 3.693 4.469 4.102 4.512 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10¹²

DEVICE TYPE: LF156 FET OP AMP
 MFG: NSC 6 DEVICES TEST DATE 04-07-83
 REF: JPL LOG 0864-1 DATE CODE 139C



DOSE, rads(Si) 2.5 MeV electrons

(S)-GAIN IN DB(1.0 MA LOAD, -10V): VS DOSE

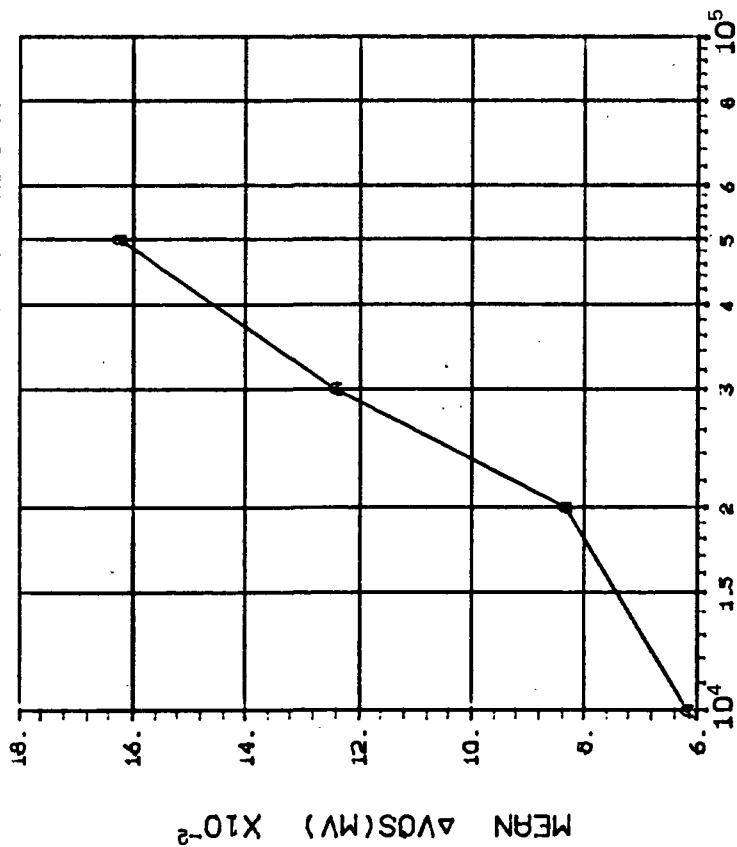
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 3.582 5.474 3.675 6.992 |

INITIAL MEAN VALUE -GAIN(DB) = 1.14X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-07-83

REF: JPL LOG 0865-1 DATE CODE 139C



DOSE, rad(Si) 2.5 MeV electrons

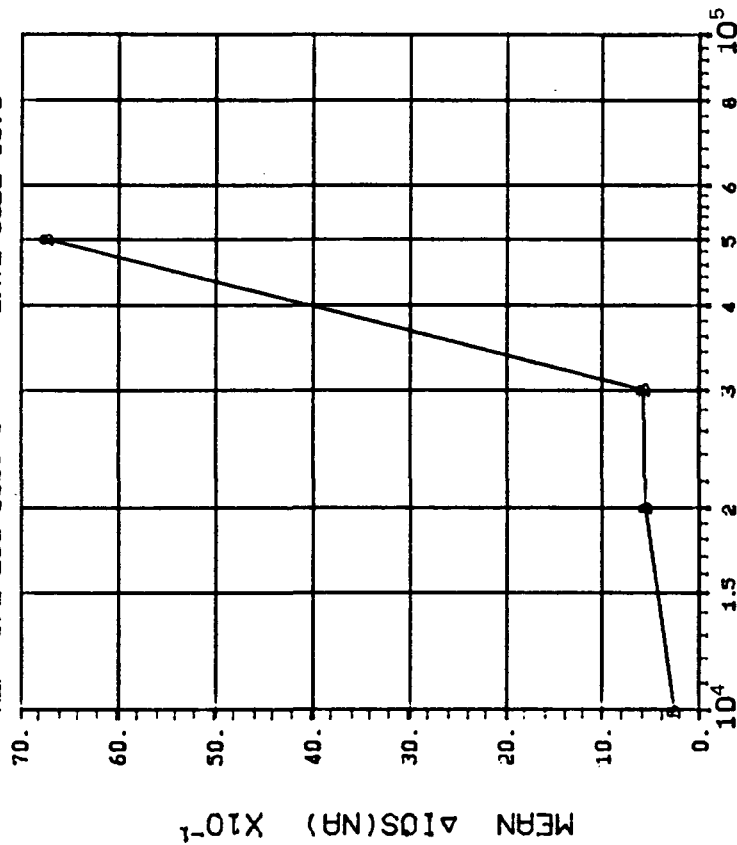
(1) $\Delta VOS(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 |
| A | .0683 | .0802 | .1090 |
| | .1620 | | |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-07-83

REF: JPL LOG 0865-1 DATE CODE 139C



DOSE, rad(Si) 2.5 MeV electrons

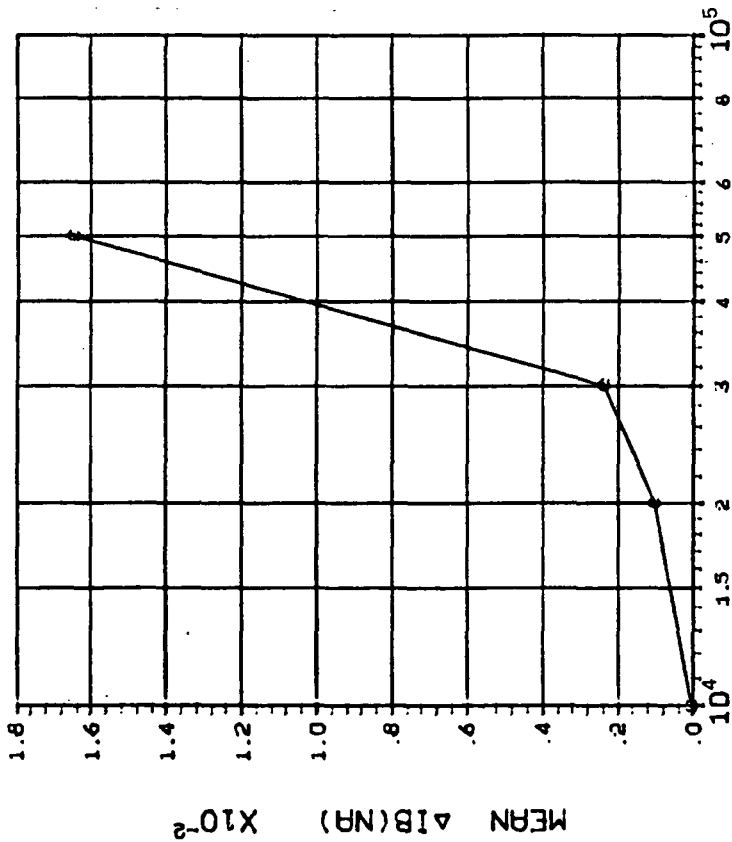
(2) $\Delta IOS(MA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 |
| B | .5019 | .7404 | .7728 |
| | 11.86 | | |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-07-83

REF: JPL LOG 0865-1 DATE CODE 139C



DOSE, rads(Si) 2.5 MeV electrons

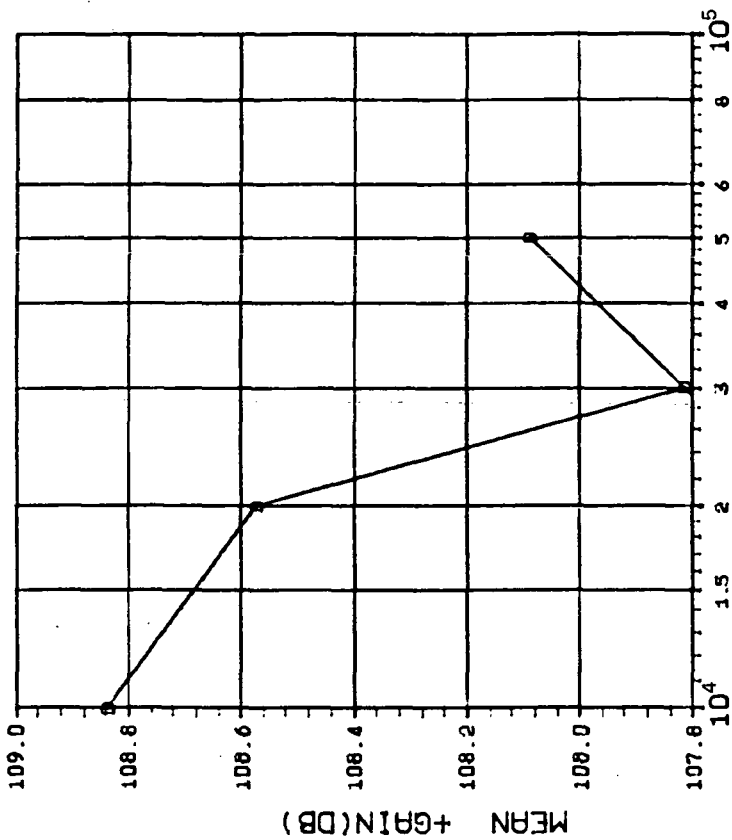
(3) ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 50 |
| C | .4891 | 1.371 | 1.621 9.769 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-07-83

REF: JPL LOG 0865-1 DATE CODE 139C



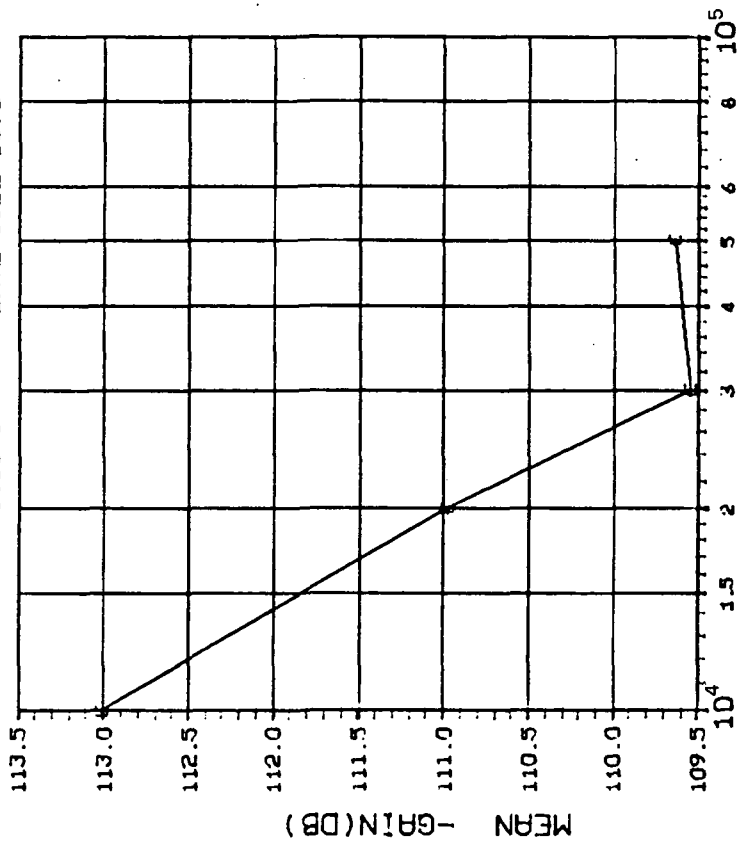
DOSE, rads(Si) 2.5 MeV electrons

(4) +GAIN IN DB(1.1MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|---------------------|--------------------|-------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| | | 10 | 20 30 50 |
| D | 1.00 | 1.660 | 1.069 .6593 2.618 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12x10¹²

DEVICE TYPE: LF156 FET OP AMP
 MFG: NSC 6 DEVICES TEST DATE 04-07-83
 REF: JPL LOG 0865-1 DATE CODE 139C



DOSE, rads(Si) 2.5 MeV electrons
 (S)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

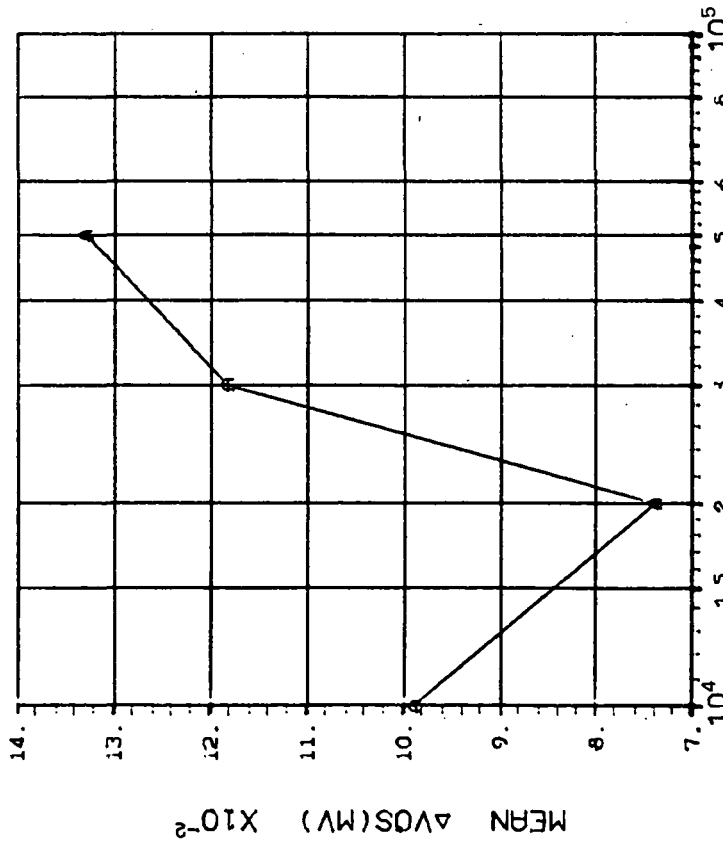
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|-------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 1.062 2.477 1.687 2.624 |

INITIAL MEAN VALUE -GAIN(DB) = $1.14 \times 10^{+2}$

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-1 DATE CODE 135C



DOSE, rads(Si) Co⁶⁰ Gammas

(1)ΔVOS(MV): VS DOSE

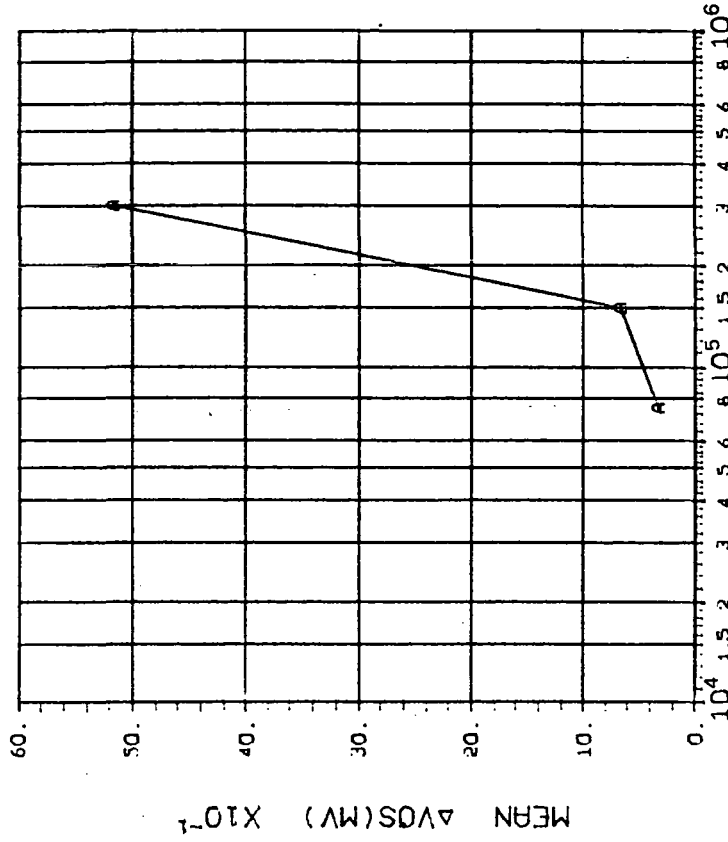
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 10 20 30 50 |
| | .1162 .0907 .1481 .1563 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-2 DATE CODE 135C



DOSE, rads(Si) Co⁶⁰ Gammas

(1)ΔVOS(MV): VS DOSE

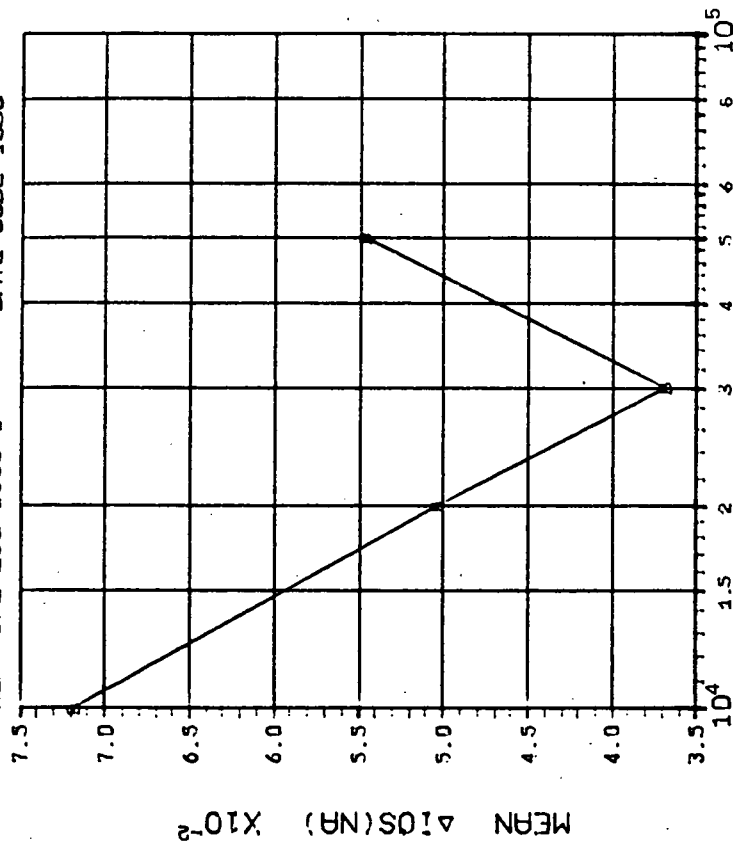
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 75 150 300 600 |
| | .5440 .7906 8.297 ***** |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-1 DATE CODE 135C



DOSE, rads(Si) Co⁶⁰ Gammas

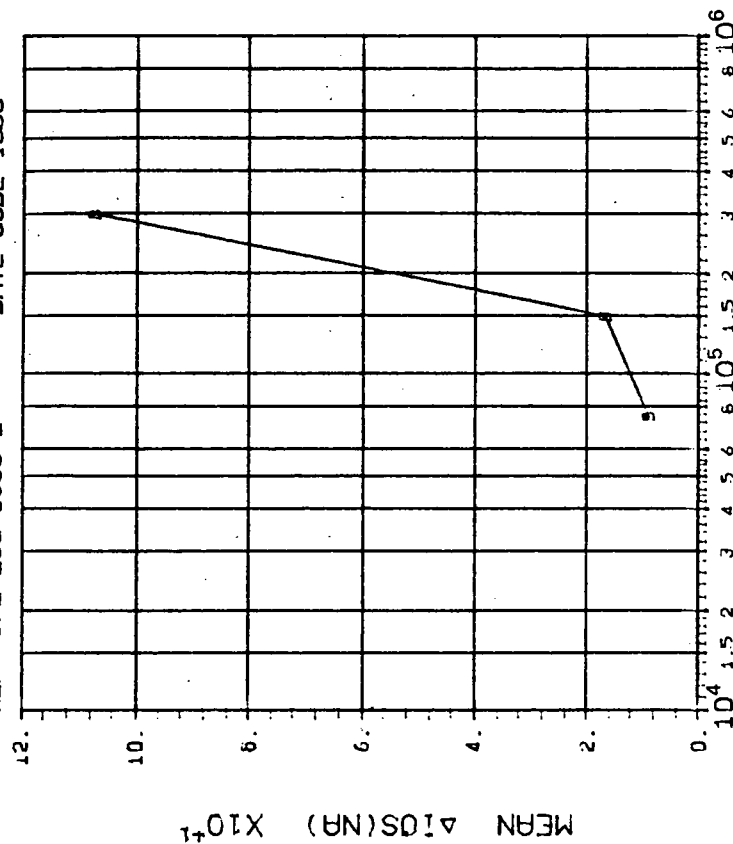
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 |
| B | .0756 | .0486 |
| | 30 | 50 |
| | .0460 | .0596 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-2 DATE CODE 135C



DOSE, rads(Si) Co⁶⁰ Gammas

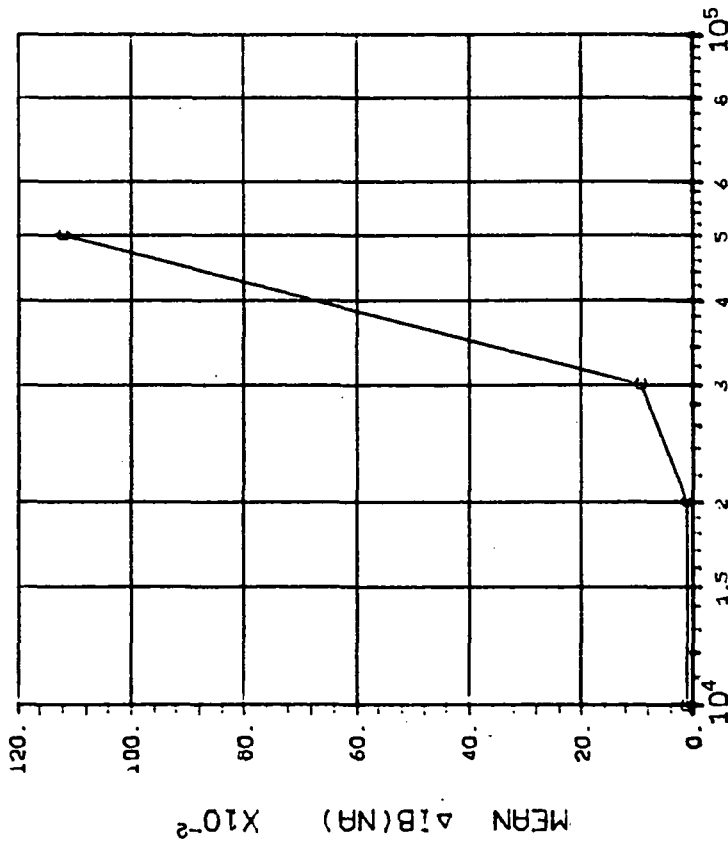
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 |
| B | 21.96 | 29.10 |
| | 300 | 600 |
| | 49.83 | ***** |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-1 DATE CODE 135C



DOSE, rads(Si) Co ⁶⁰ Gammas

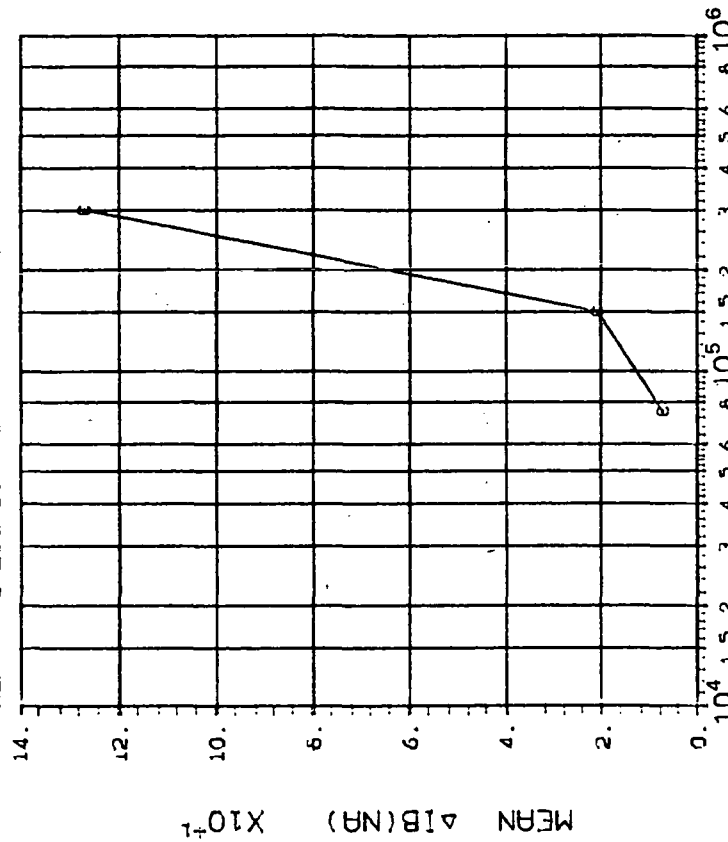
(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .0563 | .0570 .1537 2.221 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-2 DATE CODE 135C



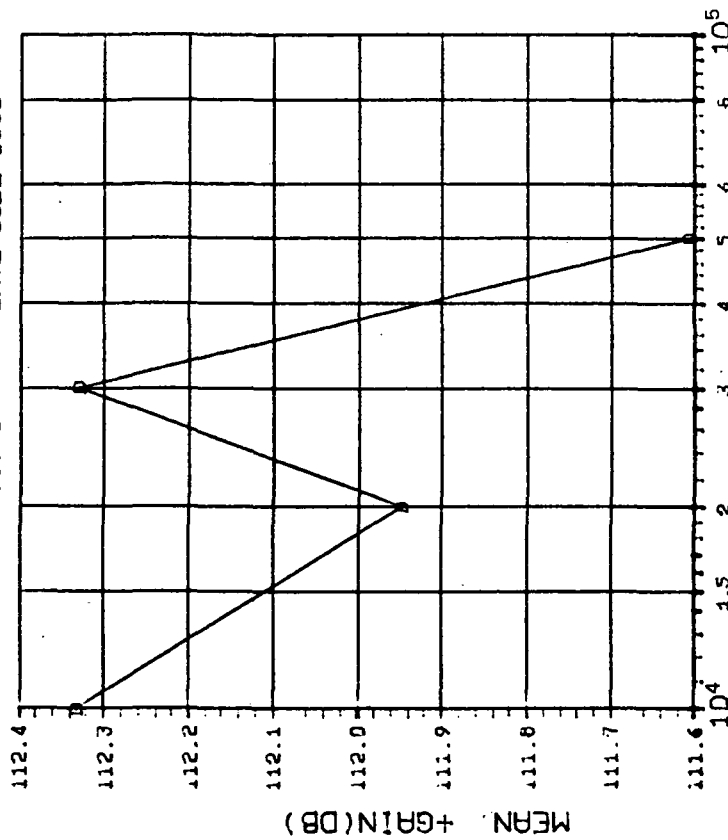
DOSE, rads(Si) Co ⁶⁰ Gammas

(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| C | 12.07 | 14.42 79.95 ***** |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83
REF: JPL LOG 0866-1 DATE CODE 135C



DOSE, rads(Si) Co 60 Gammas

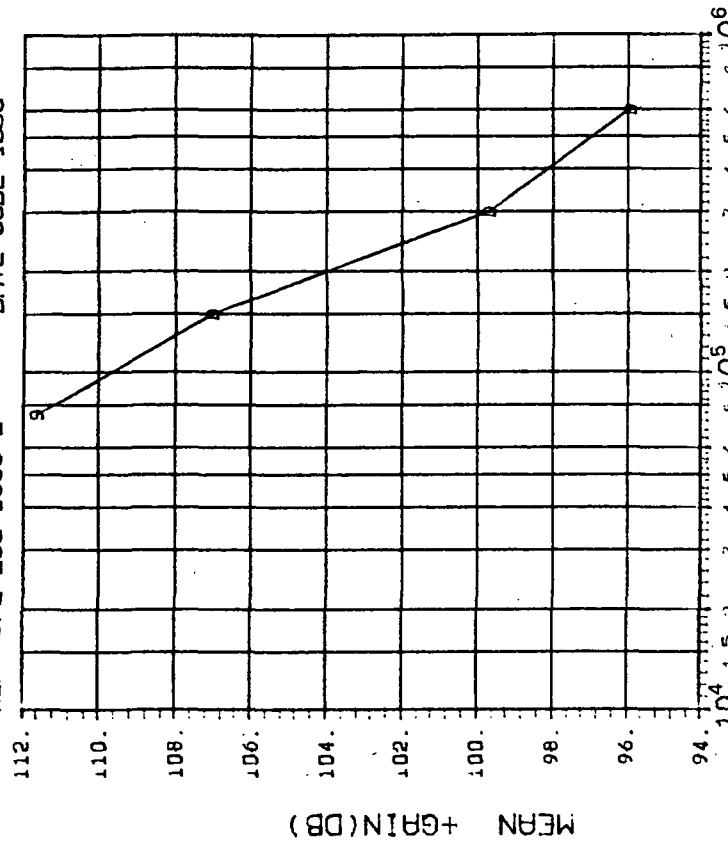
(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 3.204 2.604 2.811 1.969 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83
REF: JPL LOG 0866-2 DATE CODE 135C



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

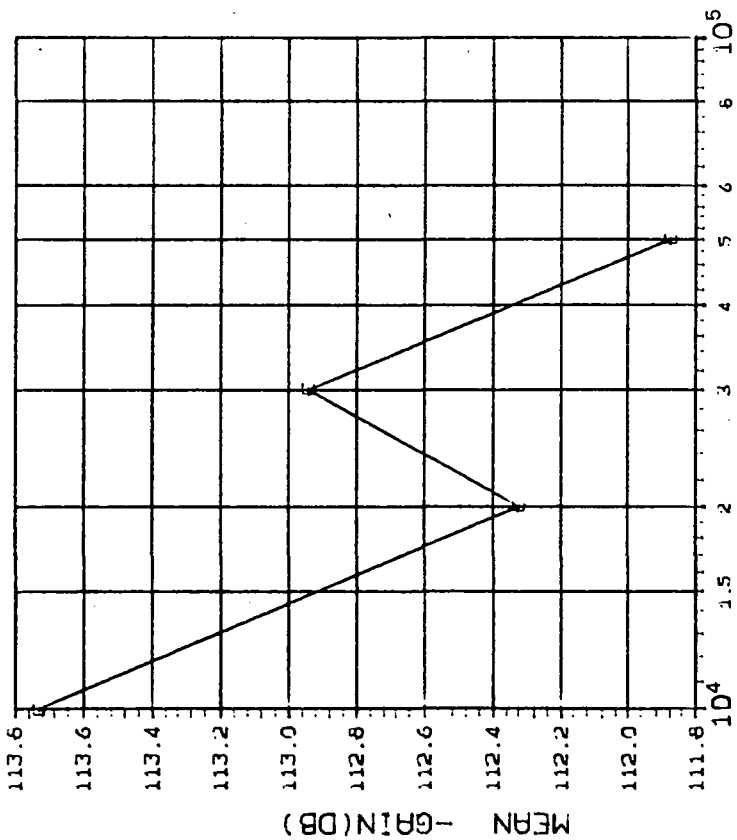
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 3.045 7.770 18.49 12.42 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-1 DATE CODE 135C



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

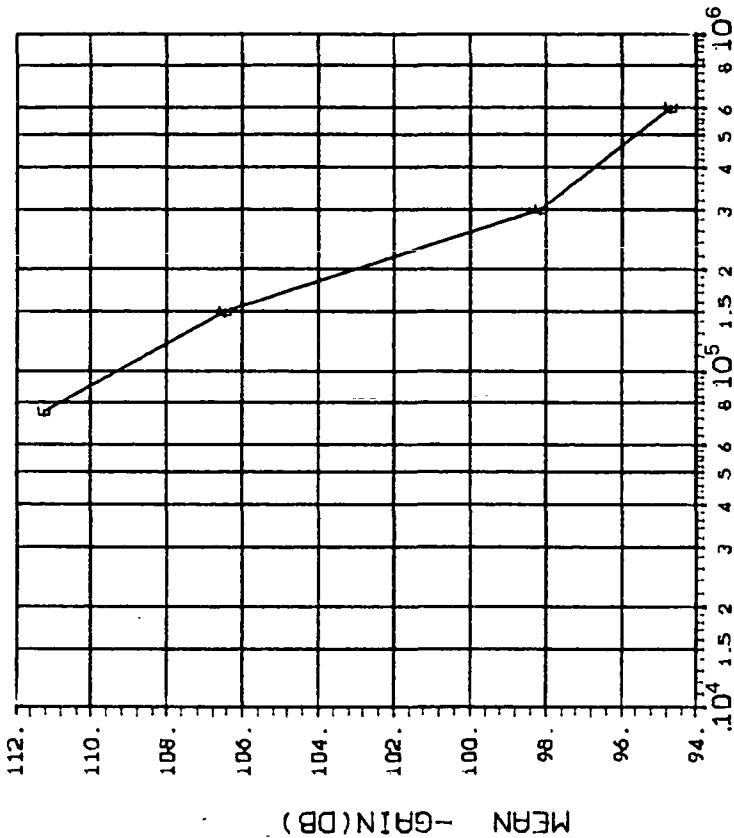
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 1.861 1.863 2.441 2.448 |

INITIAL MEAN VALUE -GAIN(DB) = 1.14X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0866-2 DATE CODE 135C



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

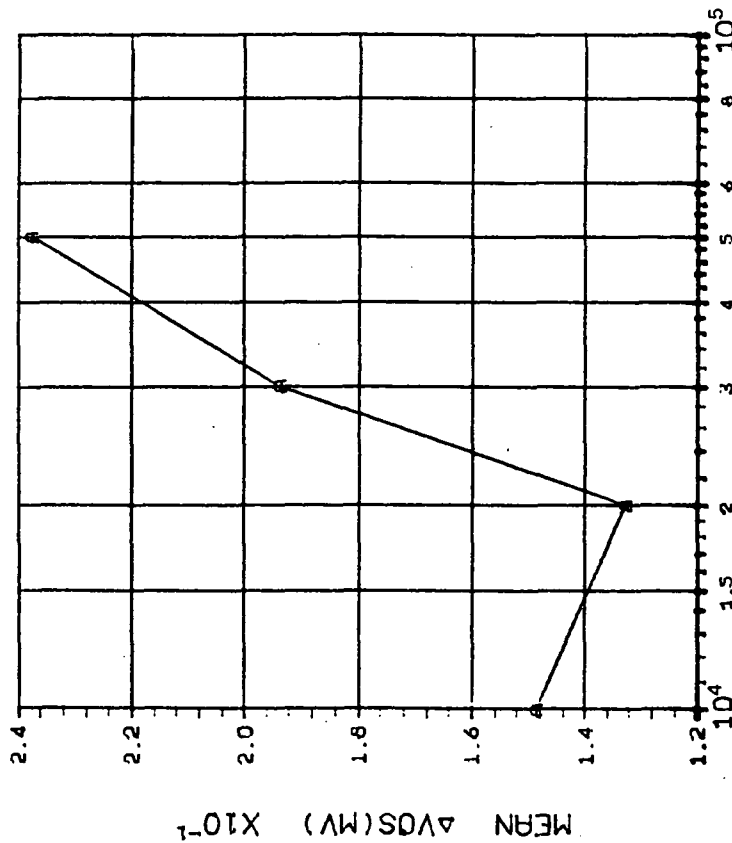
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 |
| | | 2.126 8.085 16.89 11.53 |

INITIAL MEAN VALUE -GAIN(DB) = 1.14X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-1 DATE CODE 139C



DOSE, rad(Si) Co 60 Gammas

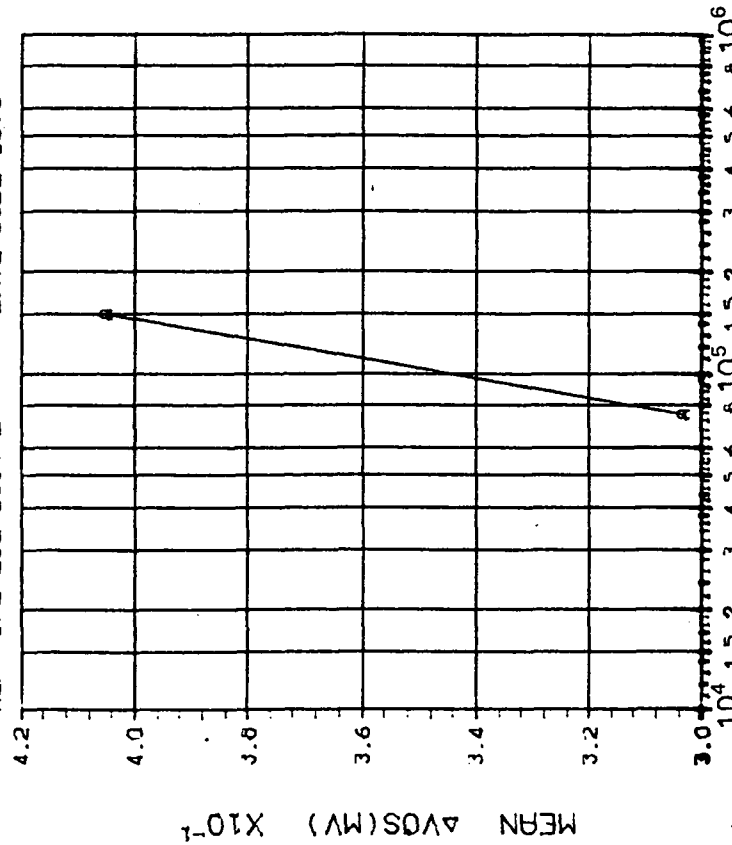
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .1118 | .1432 .3032 .3332 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-2 DATE CODE 139C



DOSE, rad(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .3901 | .4067 ***** |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-1 DATE CODE 139C

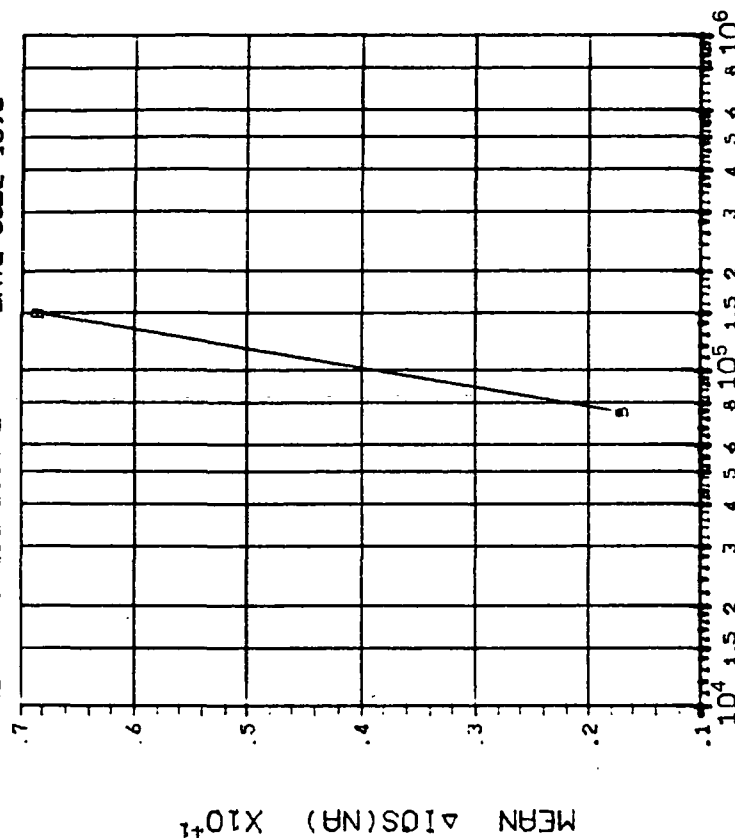


| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| B | 10 20 30 50 | .0809 .0552 .1593 .9456 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-2 DATE CODE 139C

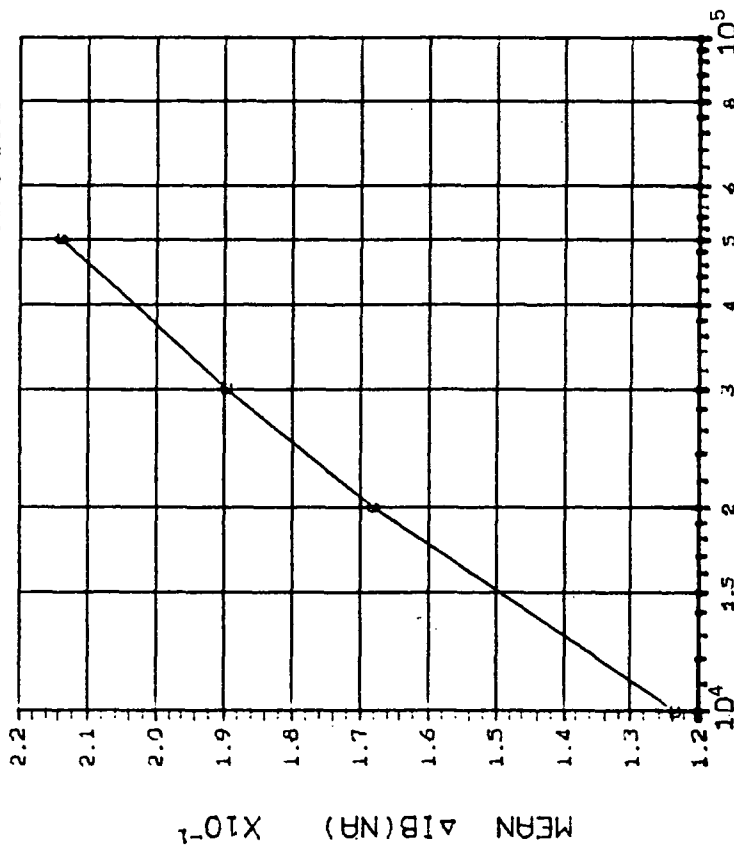


| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| B | 75 150 300 600 | 2.729 5.818 ***** |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-1 DATE CODE 139C



DOSE, rads(Si) Co 60 Gammas

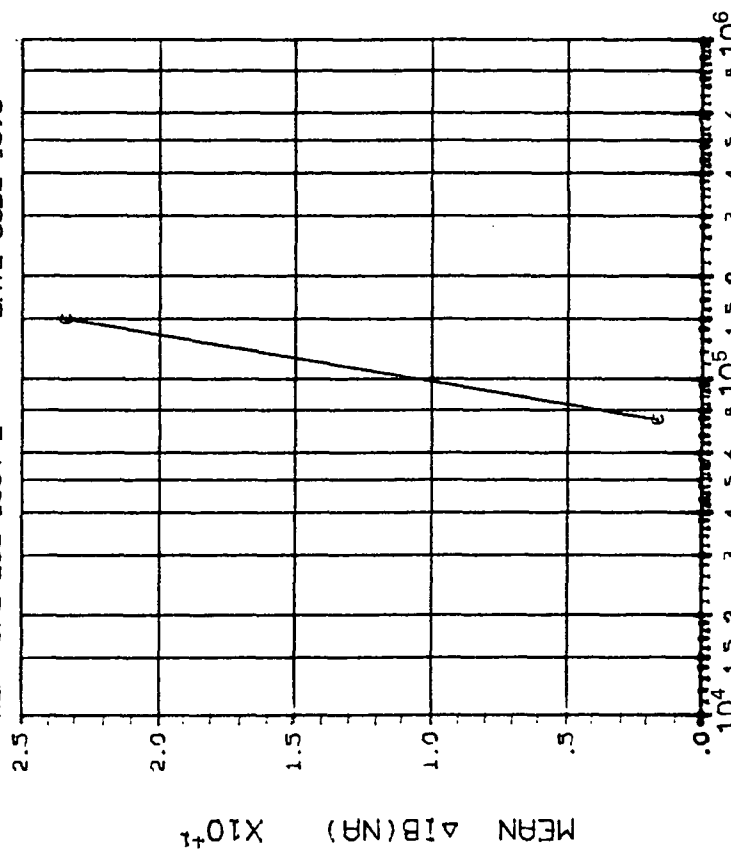
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .3135 | .4640 .6429 .9204 |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-2 DATE CODE 139C



DOSE, rads(Si) Co 60 Gammas

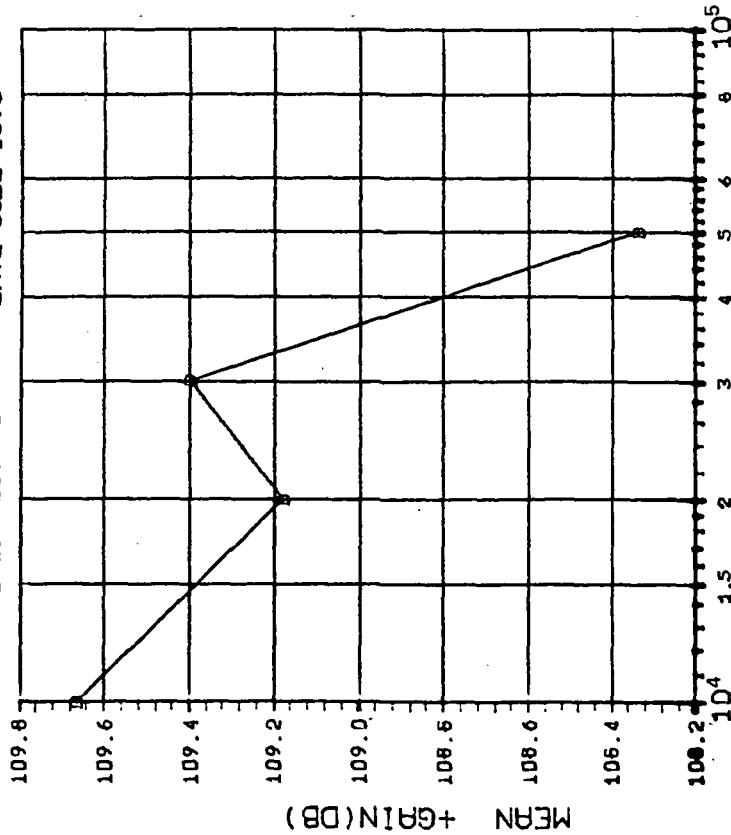
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| C | 1.566 | 15.07 ***** |

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-1 DATE CODE 139C



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

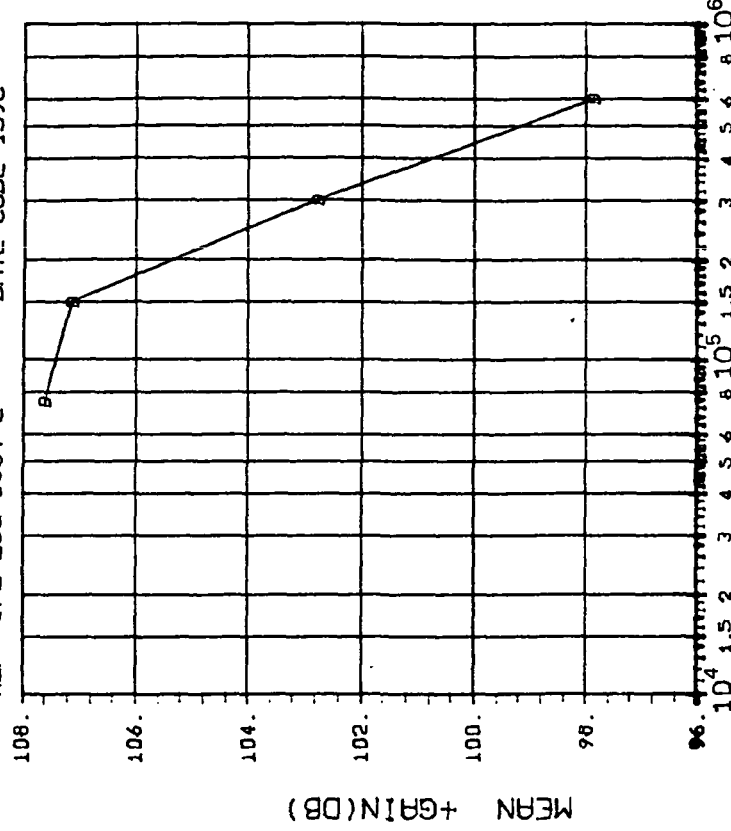
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 2.751 2.492 1.232 2.095 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-2 DATE CODE 139C



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

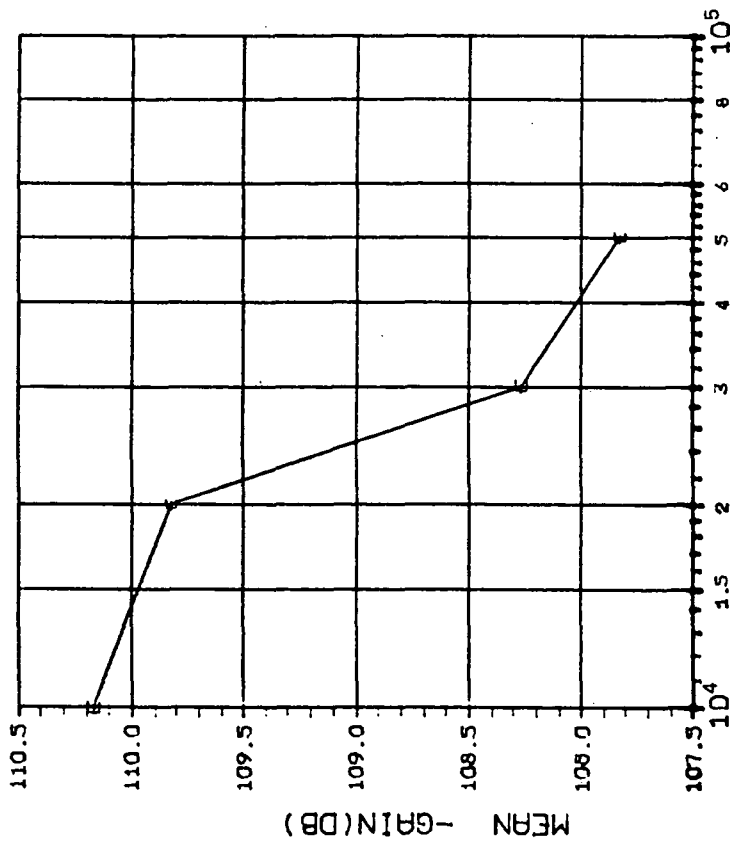
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 600 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-1 DATE CODE 139C



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

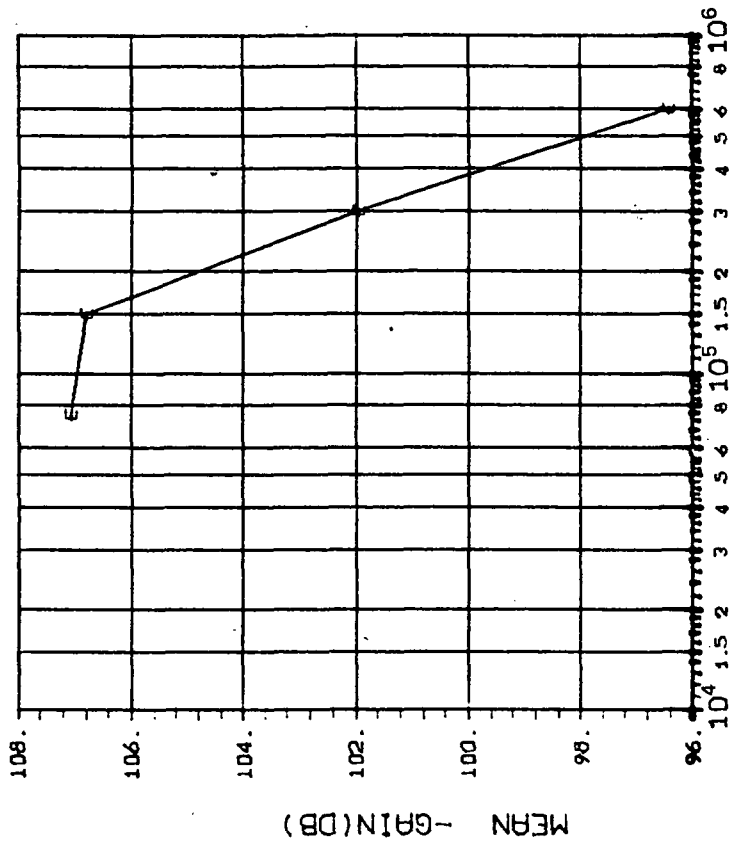
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 3.336 4.114 3.787 4.747 |

INITIAL MEAN VALUE -GAIN(DB) = 1.10X10⁺²

DEVICE TYPE: LF156 FET OP AMP

MFG: NSC 6 DEVICES TEST DATE 04-12-83

REF: JPL LOG 0867-2 DATE CODE 139C



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

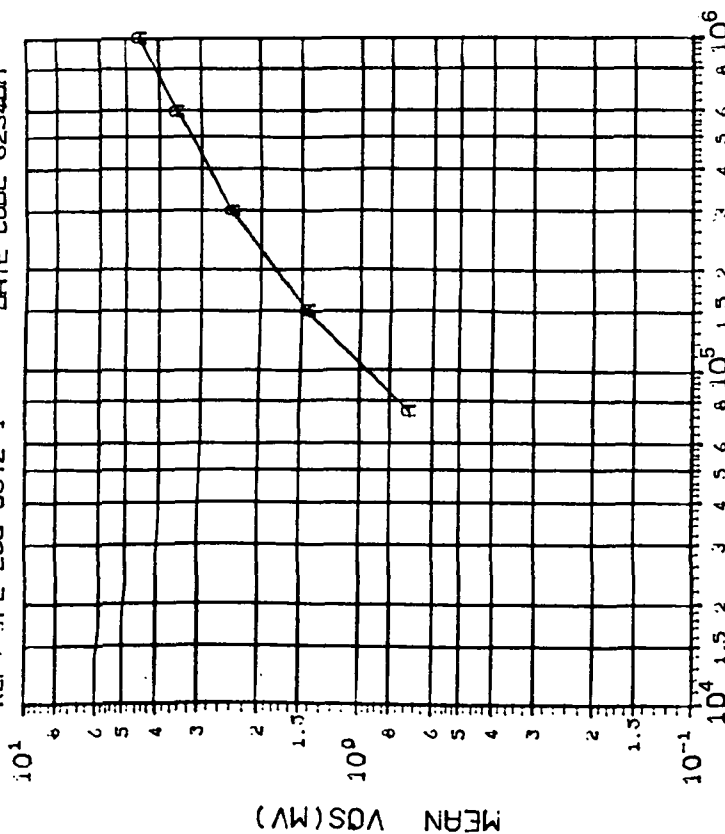
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 3.817 2.720 6.343 11.26 |

INITIAL MEAN VALUE -GAIN(DB) = 1.10X10⁺²

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0872-1 DATE CODE 8234DM



DOSE, rads(Si) 2.5 MeV electrons

(1) VDS (VIN=OV) IN MV: VS DOSE

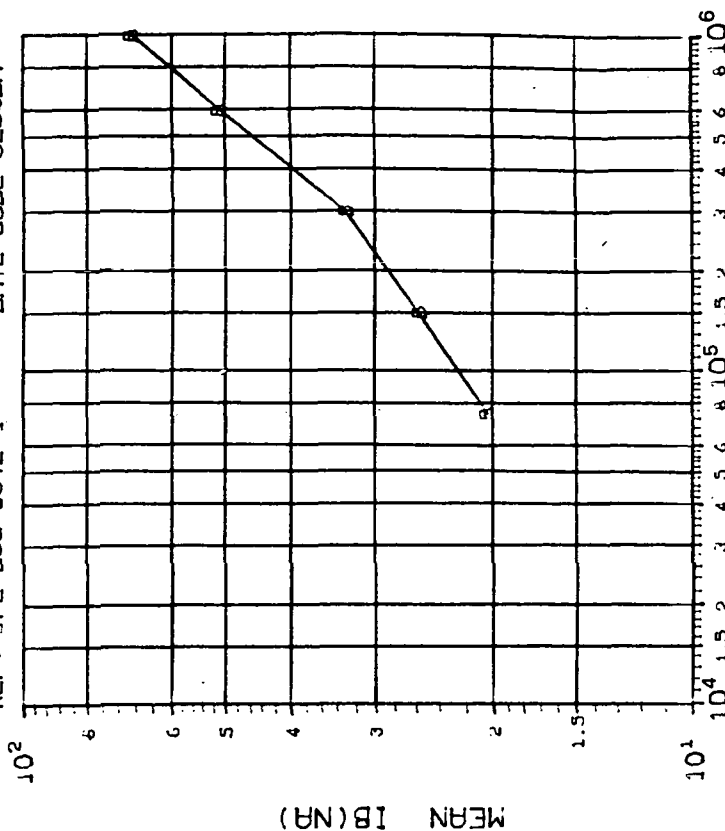
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | | |
|-------------------------------------|--------------------|-------|-------|-------|-------|--|
| CURVE | DOSE, kilorads(Si) | | | | | |
| | 75 | 150 | 300 | 600 | 1000 | |
| A | 1.262 | 1.974 | 2.610 | 3.262 | 3.189 | |

INITIAL MEAN VALUE VDS(MV) = 2.65×10^{-1}

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0872-1 DATE CODE 8234DM



DOSE, rads(Si) 2.5 MeV electrons

(2) IB (VIN=OV) IN NA: VS DOSE

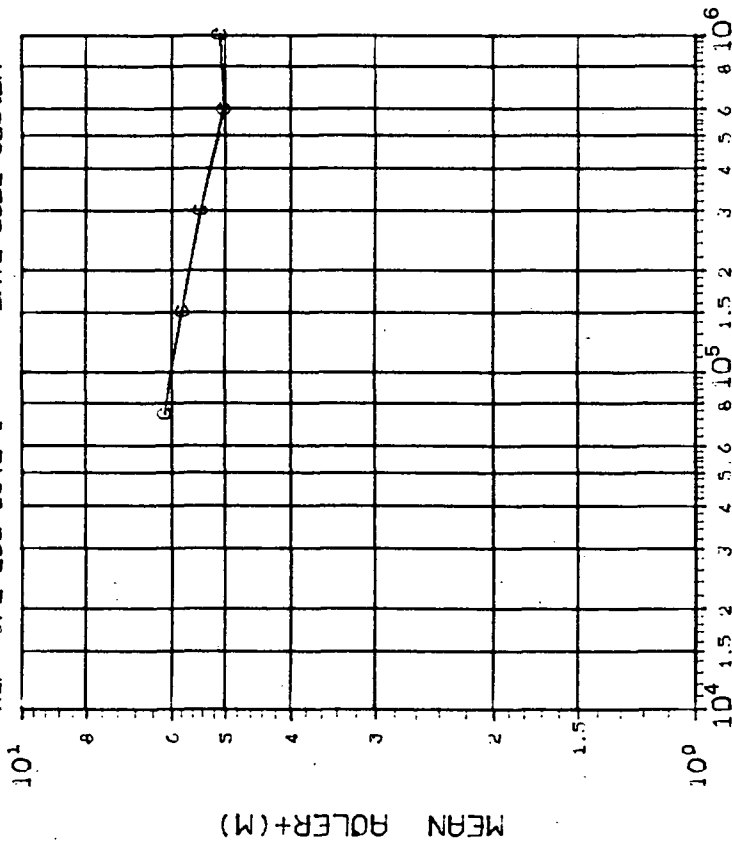
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | | |
|-------------------------------------|--------------------|-------|-------|-------|-------|--|
| CURVE | DOSE, kilorads(Si) | | | | | |
| | 75 | 150 | 300 | 600 | 1000 | |
| B | 7.063 | 9.707 | 17.29 | 31.01 | 43.09 | |

INITIAL MEAN VALUE IB(NA) = 1.27×10^{-1}

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: QMD 5 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0872-1 DATE CODE 8234DM



DOSE, rads(Si) 2.5 MeV electrons

(3) AOLER+ (RL=10K, VO=+10V) IN M: VS DOSE

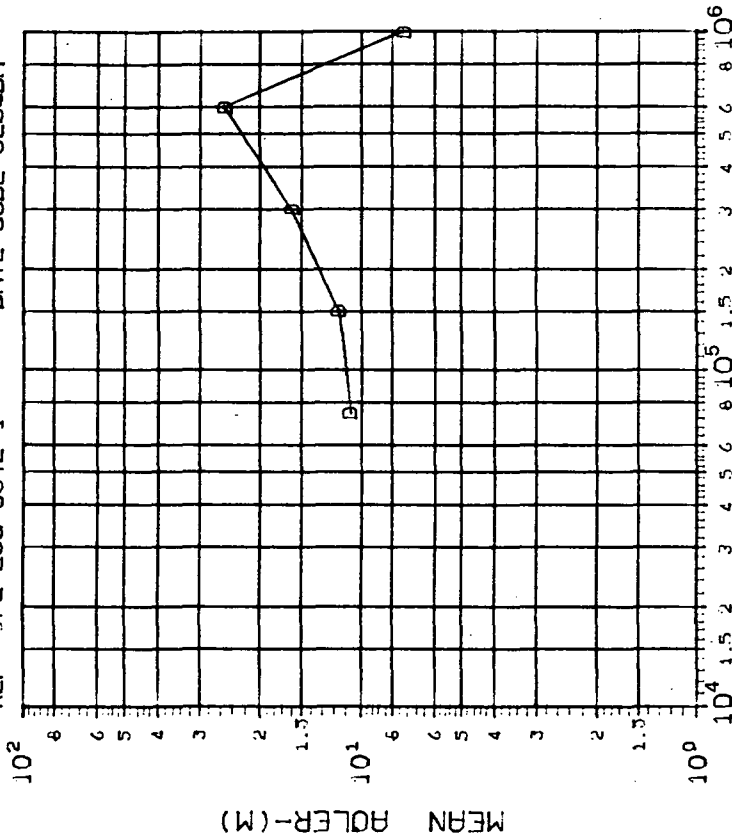
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 75 | 150 | 300 | 600 1000 |
| C | 1.101 | .7861 | .6362 | .7081 .6231 |

INITIAL MEAN VALUE AOLER+(M) = $6.21 \times 10^{+0}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: QMD 5 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0872-1 DATE CODE 8234DM



DOSE, rads(Si) 2.5 MeV electrons

(4) AOLER- (RL=10K, VO=-10V) IN M: VS DOSE

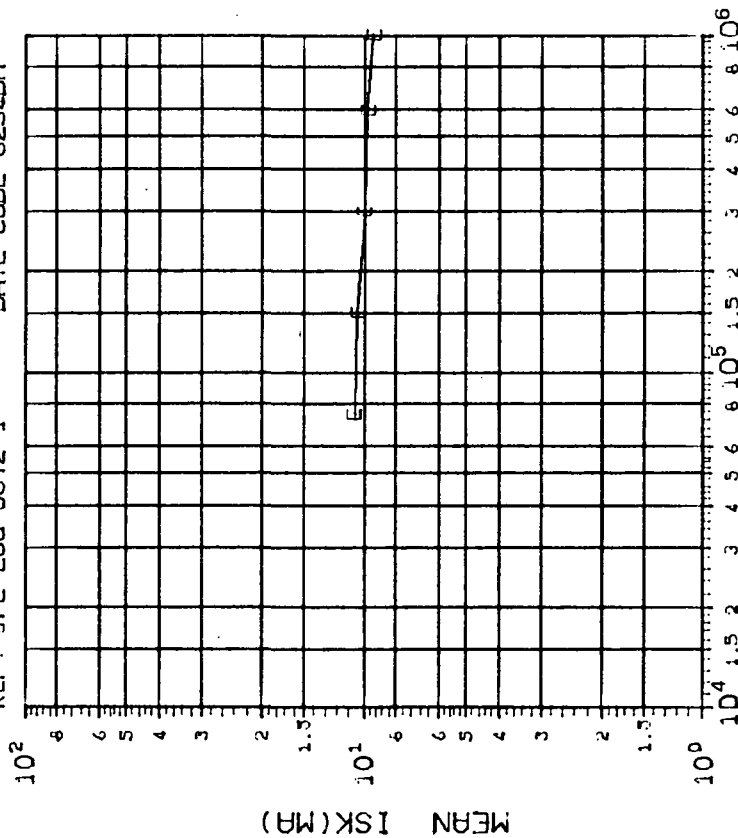
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 75 | 150 | 300 | 600 1000 |
| D | 27.33 | 31.23 | 44.29 | 68.24 30.40 |

INITIAL MEAN VALUE AOLER-(M) = $6.28 \times 10^{+0}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0872-1 DATE CODE 8234DM



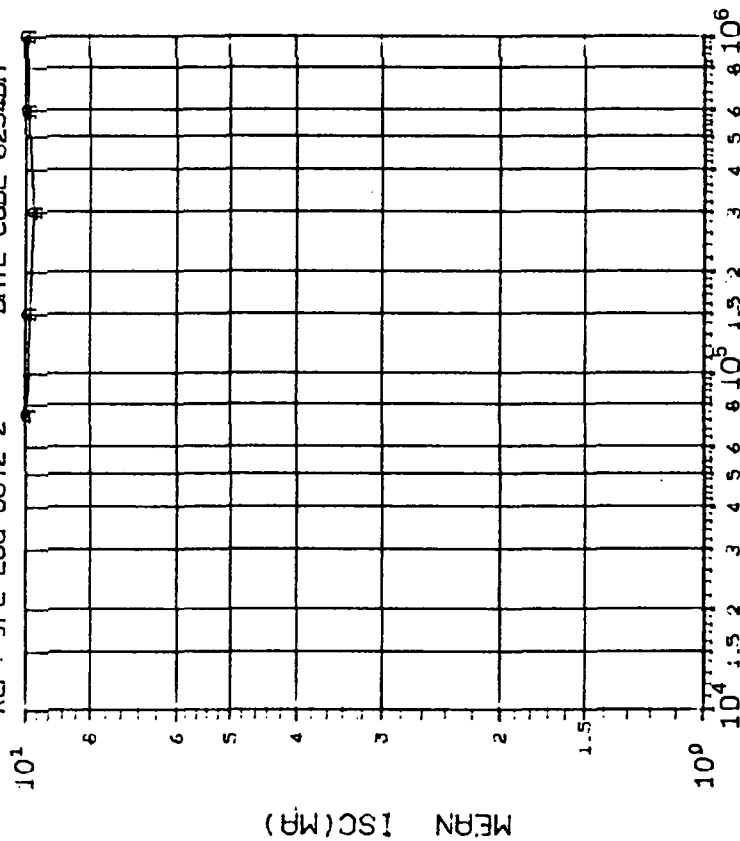
(5)ISK (VIN=0 V, VDS=+1V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------------|------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 1000 |
| E | .6291 .6695 .7302 .7314 .7476 | |

INITIAL MEAN VALUE ISK(MA) = 1.14×10^1

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83
REF: JPL LOG 0872-2 DATE CODE 8234DM



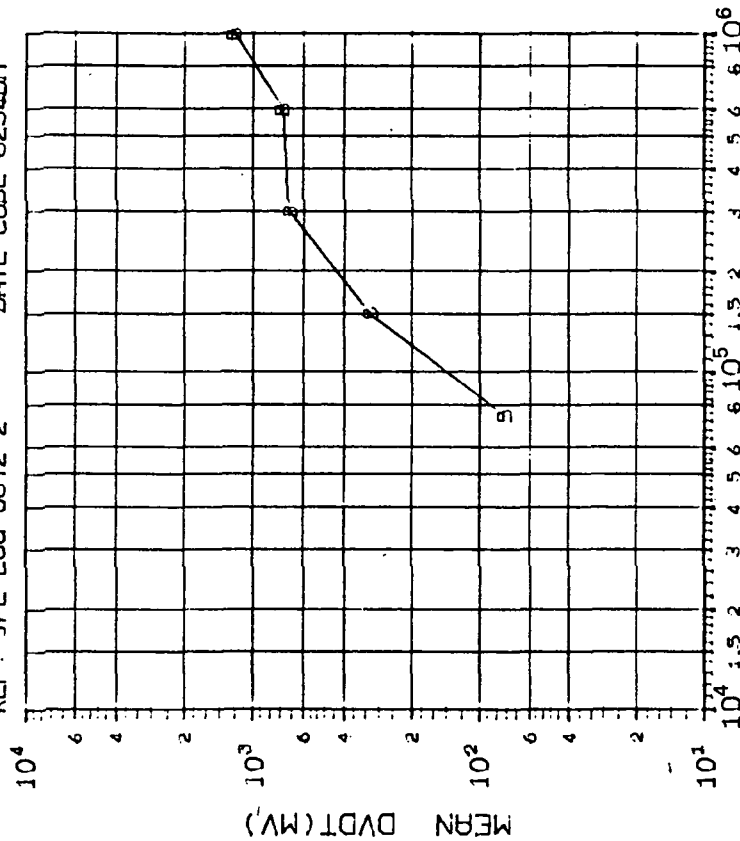
(1)ISC (VIN=0 V, VCE=-1V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| A | 1000 |
| | 1500 |
| | 2000 |
| | 3000 |

INITIAL MEAN VALUE ISC(MA) = $9.90 \times 10^{+0}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83
REF: JPL LOG 0872-2 DATE CODE 8234DM



(2)DVDT (VIN=0 V, CFF=0.1 UF) IN MV: VS DOSE

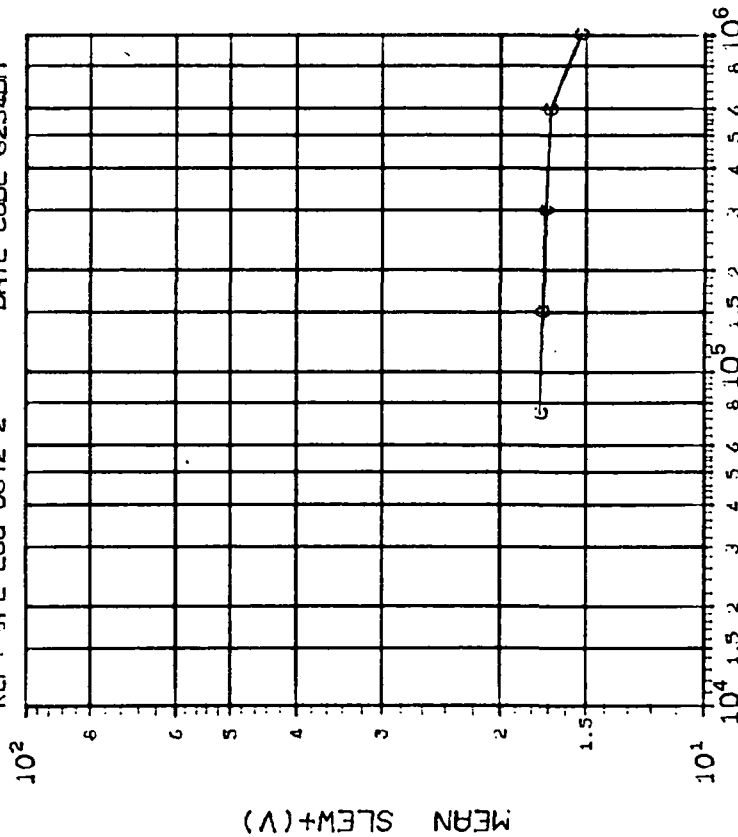
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| B | 1000 |
| | 1500 |
| | 2000 |
| | 3000 |

INITIAL MEAN VALUE DVDT(MV) = 7.15×10^{-1}

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0872-2 DATE CODE 8234DM



DOSE, rads(Si) 2.5 MeV electrons

(3)SLEW+ (-V_{GS}=10V, CH=0 UF) IN V: VS DOSE

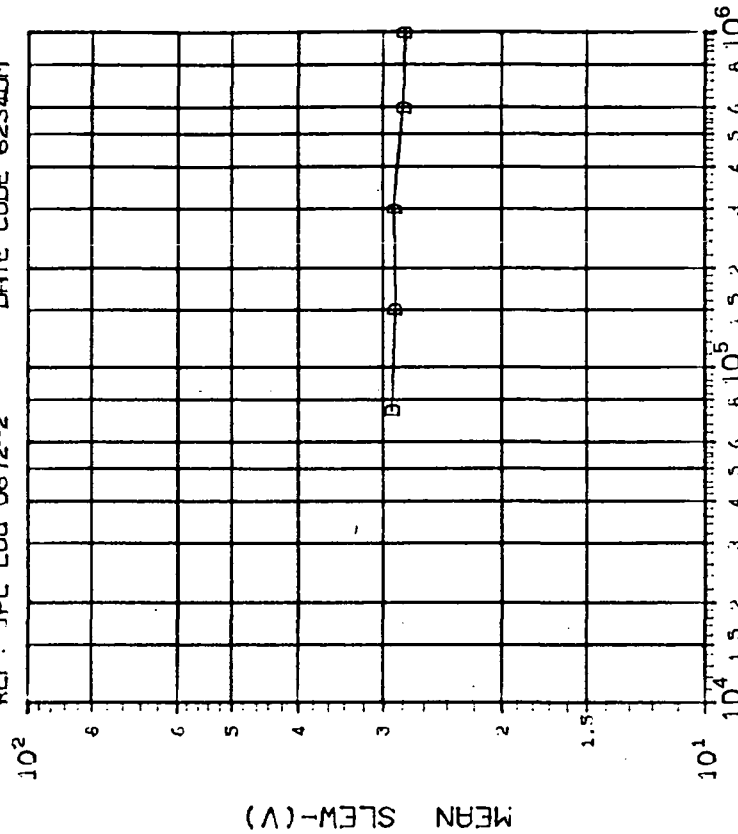
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 1000 |
| C | 21.64 | 21.61 20.34 20.68 18.45 |

INITIAL MEAN VALUE SLEW+(V) = 1.82X10⁺¹

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83

REF: JPL LOG 0872-2 DATE CODE 8234DM



DOSE, rads(Si) 2.5 MeV electrons

(4)SLEW- (-V_{GS}=10V, CH=0 UF) IN V: VS DOSE

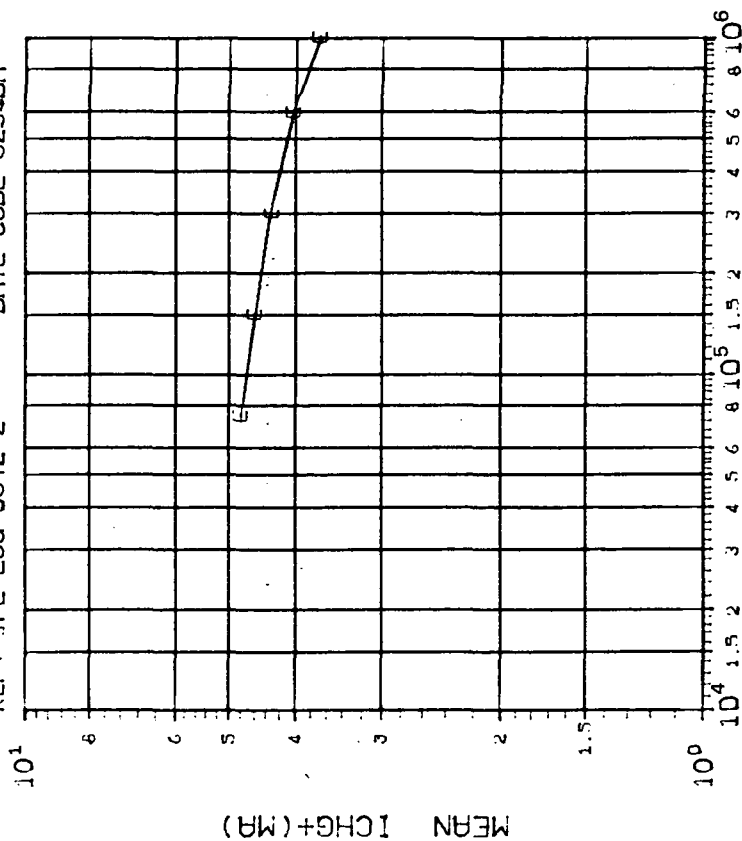
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 1000 |
| D | 1.412 | 1.629 1.631 1.130 1.602 |

INITIAL MEAN VALUE SLEW-(V) = 3.00X10⁺¹

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 05-26-83

REF: IPL LOG 0872-2 DATE CODE 8234DM



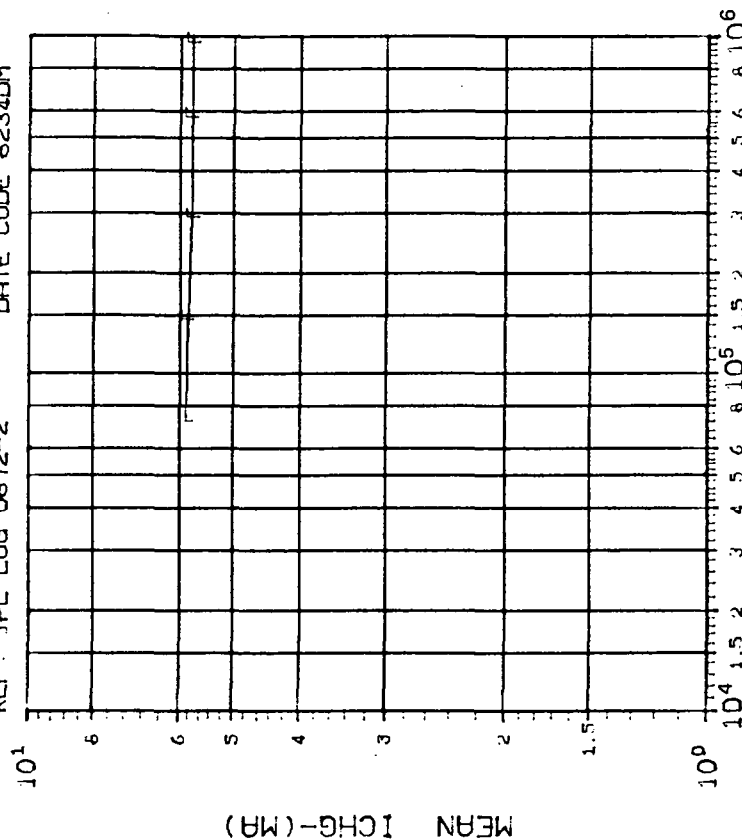
MEAN ICHG+ (MA)

DOSE, rads(Si) 2.5 MeV electrons

(5) ICHG+ (VOUT-VIN=-2V) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| E | 75 | 150 |
| | 300 | 600 |
| | 1000 | |
| | .2569 | .2740 |
| | .2831 | .3003 |
| | .3120 | |

INITIAL MEAN VALUE ICHG+ (MA) = 5.59×10^{-10}



MEAN ICHG- (MA)

DOSE, rads(Si) 2.5 MeV electrons

(6) ICHG- (VOUT-VIN=-2V) VS DOSE

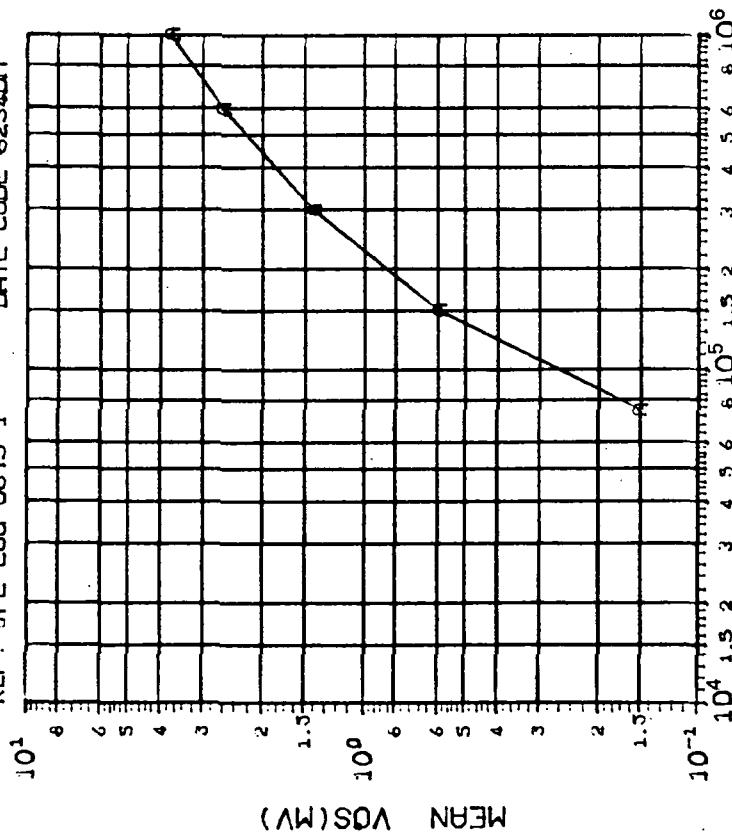
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| F | 75 | 150 |
| | 300 | 600 |
| | 1000 | |
| | .1582 | .1579 |
| | .1864 | .1720 |
| | .1709 | |

INITIAL MEAN VALUE ICHG- (MA) = 5.95×10^{-10}

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 03-27-83

REF: JPL LOG 0873-1 DATE CODE 8234DM



DOSE, rads(Si) Co⁶⁰ Gammas

(1) VDS (VINE=0V) IN MV: VS DOSE

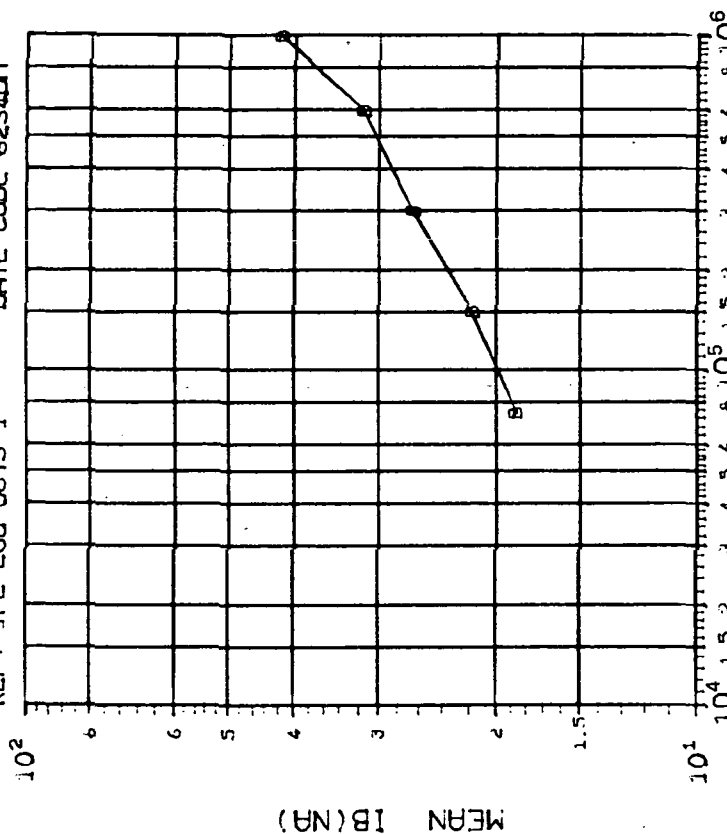
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| A | 75 | 1000 |
| | .3596 | 4.148 1.013 1.648 2.329 |

INITIAL MEAN VALUE VDS(MV) = 4.29×10^{-1}

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 03-27-83

REF: JPL LOG 0873-1 DATE CODE 8234DM



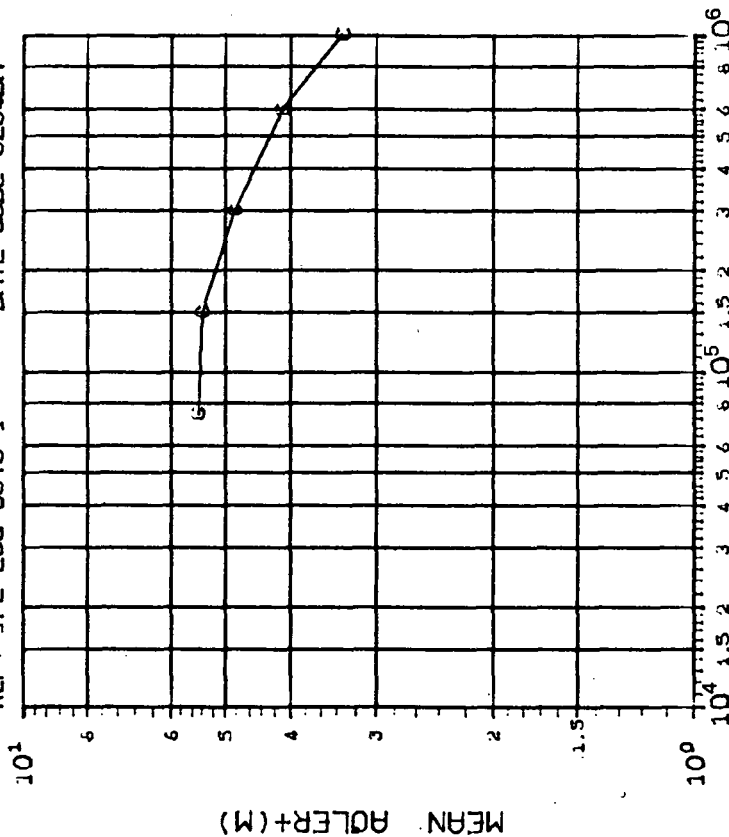
DOSE, rads(Si) Co⁶⁰ Gammas

(2) IB (VINE=0V) IN NA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| B | 75 | 1000 |
| | 5.122 | 5.639 7.001 11.15 16.31 |

INITIAL MEAN VALUE IB(NA) = 1.44×10^{-1}

DEVICE TYPE: LF198 FET SAMPLE & HOLD
MFG: AMD 5 DEVICES TEST DATE 05-27-83
REF: JPL LOG 0873-1 DATE CODE 8234DM



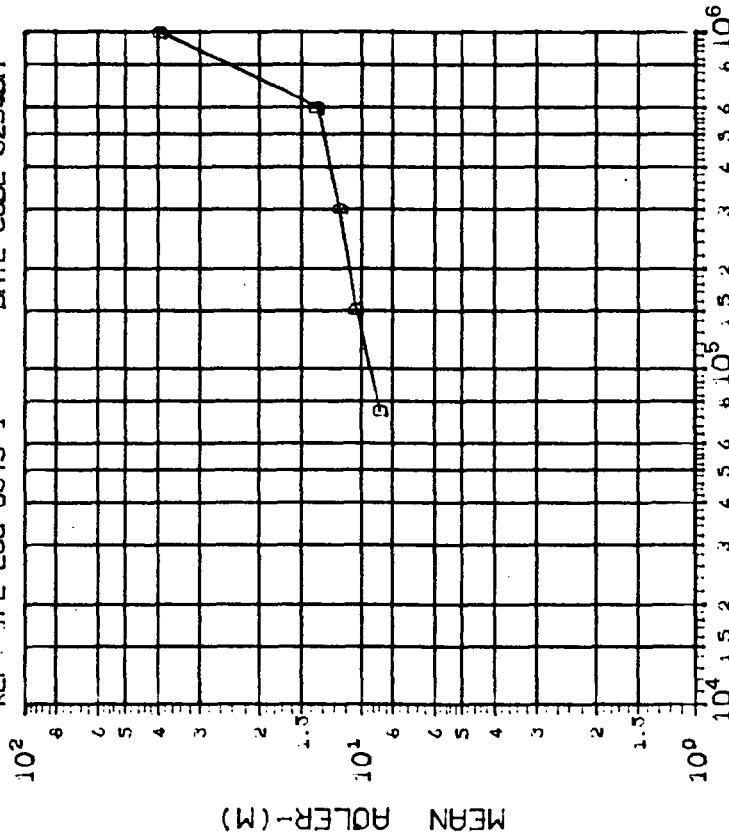
DOSE, rads(Si) Co⁶⁰ Gammas

(3) AOLER+ (RL=10K, V_{DS}=+10V) IN M: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .6832 .4713 1.068 1.602 1.731 |

INITIAL MEAN VALUE AOLER+(M) = 5.37X10⁻⁹

DEVICE TYPE: LF198 FET SAMPLE & HOLD
MFG: AMD 5 DEVICES TEST DATE 05-27-83
REF: JPL LOG 0873-1 DATE CODE 8234DM



DOSE, rads(Si) Co⁶⁰ Gammas

(4) AOLER- (RL=10K, V_{DS}=-10V) IN M: VS DOSE

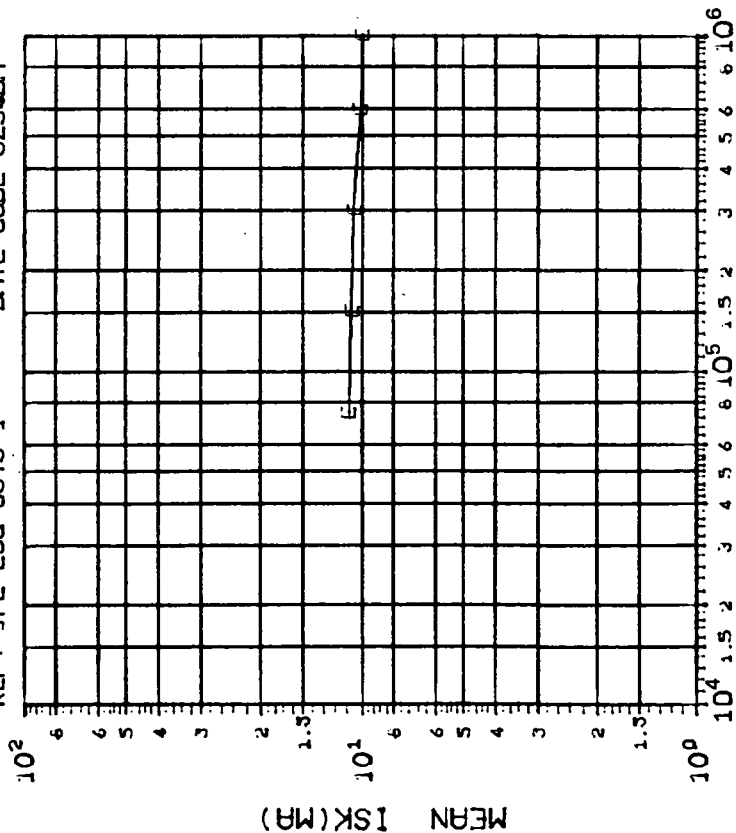
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | 19.29 22.86 27.43 34.93 89.51 |

INITIAL MEAN VALUE AOLER-(M) = 4.52X10⁻⁹

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 03-27-83

REF: JPL LOG 0873-1 DATE CODE 8234DM



DOSE, rads(Si) Co⁶⁰ Gammas

(5) ISK (VIN=OV, VGE=+1V) IN MA: VS DOSE

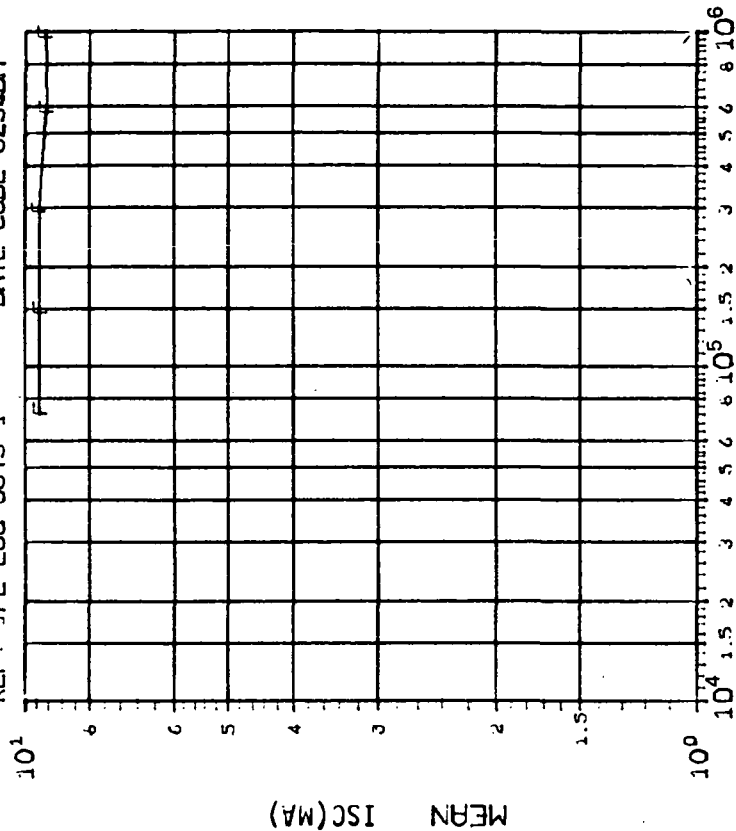
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| E | 75 | 150 |
| | 300 | 600 |
| | 1000 | 1000 |
| | .1683 | .2358 |
| | .1871 | .2689 |

INITIAL MEAN VALUE ISK(MA) = $1.14 \times 10^{+1}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 5 DEVICES TEST DATE 03-27-83

REF: JPL LOG 0873-1 DATE CODE 8234DM



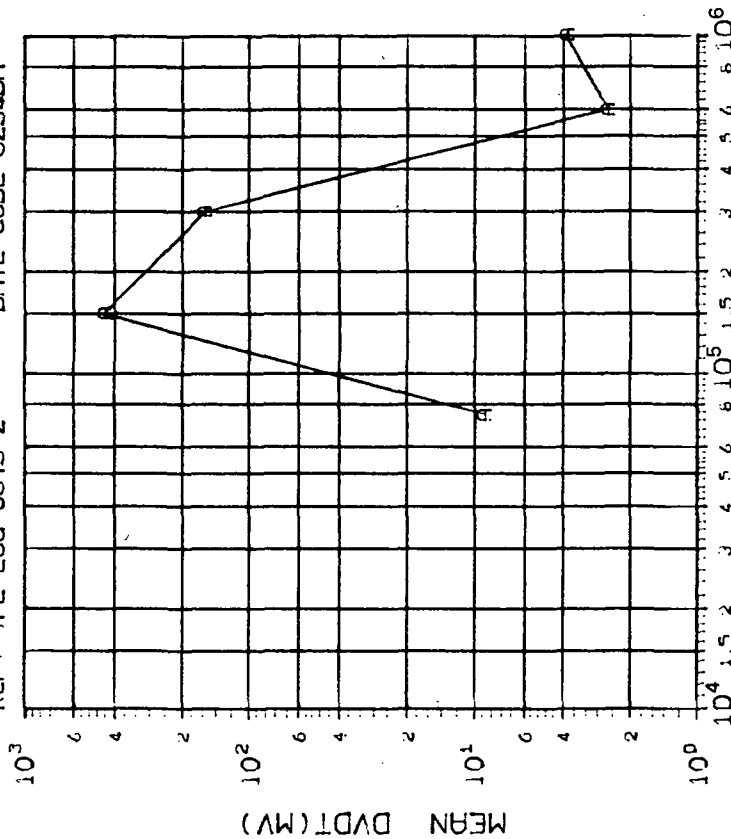
DOSE, rads(Si) Co⁶⁰ Gammas

(6) ISC (VIN=OV, VGE=-1V) IN MA: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| F | 75 | 150 |
| | 300 | 600 |
| | 1000 | 1000 |
| | .4262 | .4021 |
| | .4646 | .4571 |
| | .4973 | |

INITIAL MEAN VALUE ISC(MA) = $9.62 \times 10^{+0}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD
 MFG: QMD 4 DEVICES TEST DATE 05-27-83
 REF: TPL LOG 0873-2 DATE CODE 8234DM



DOSE, rad(Si) Co60 Gammas

(1) DVDT (VINE-O V, CH-01 UF) IN MV: VS DOSE

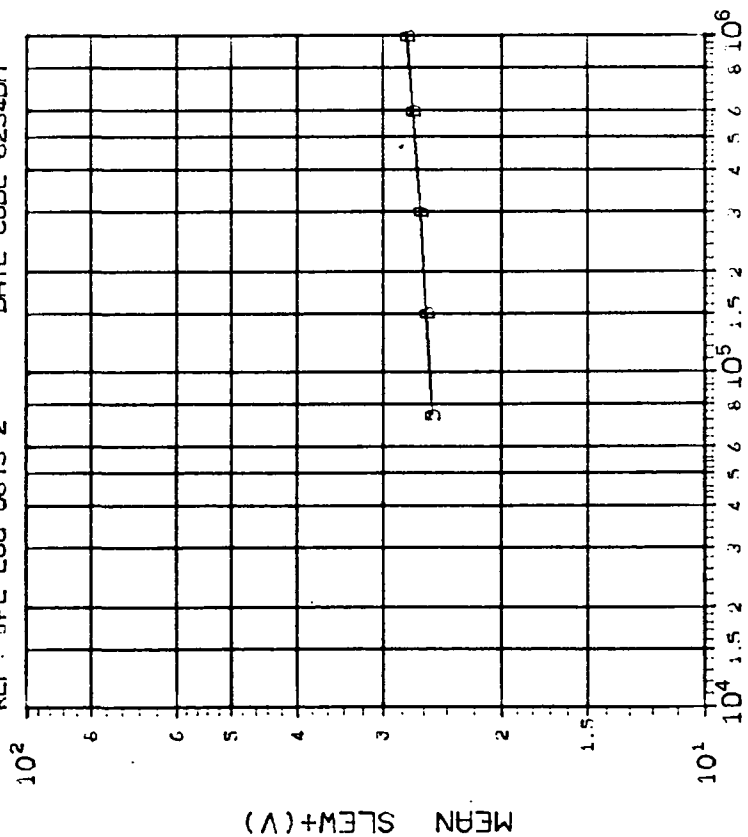
| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 75 | 150 | 300 |
| A | 3.382 | 388.7 | 314.1 |
| | 600 | 1000 | |
| | 4.199 | 4.064 | |

INITIAL MEAN VALUE DVDT(MV) = 6.54X10⁻¹

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: QMD 4 DEVICES TEST DATE 05-27-83

REF: JPL LOG 0873-2 DATE CODE 8234DM



DOSE, rads(Si) Co 60 Gammas

(2) SLEW+ (-V0=10V, CH= 0 UF) IN V: VS DOSE

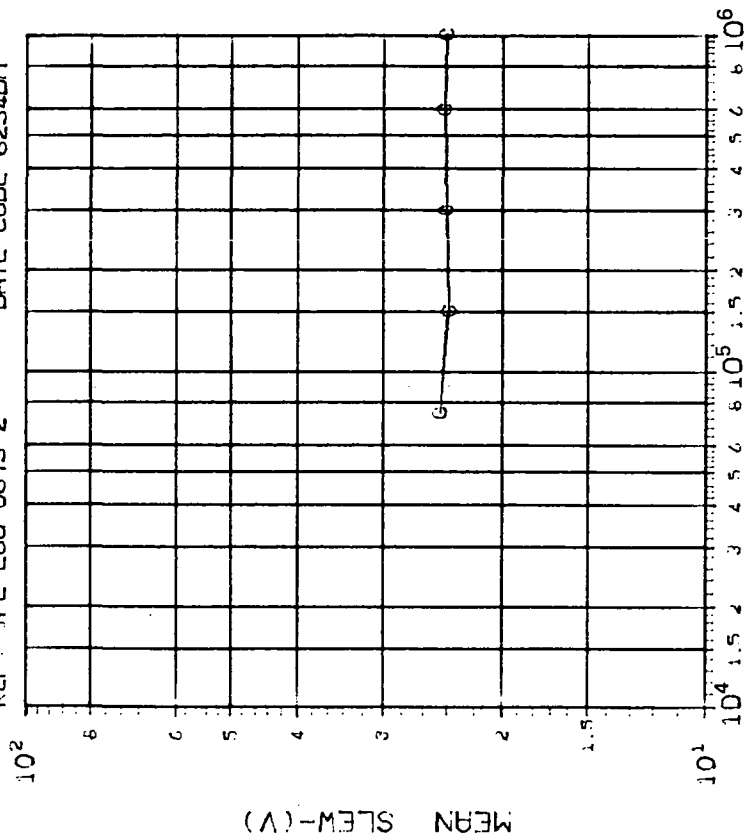
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| 9 | 75 |
| | 150 |
| | 300 |
| | 600 |
| 9 | 1000 |
| | 9.573 |
| | 9.636 |
| | 9.619 |
| | 9.966 |
| | 9.277 |

INITIAL MEAN VALUE SLEW+(V) = $2.68 \times 10^{+1}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: QMD 4 DEVICES TEST DATE 05-27-83

REF: JPL LOG 0873-2 DATE CODE 8234DM



DOSE, rads(Si) Co 60 Gammas

(3) SLEW- (-V0=10V, CH= 0 UF) IN V: VS DOSE

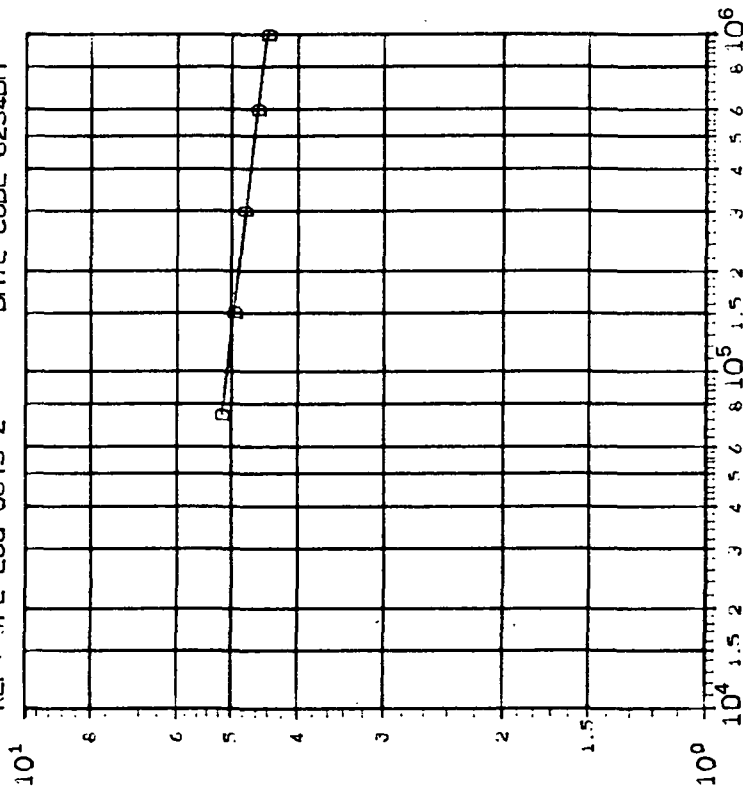
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| 6 | 75 |
| | 150 |
| | 300 |
| | 600 |
| 6 | 1000 |
| | .6663 |
| | .6397 |
| | .2558 |
| | .6847 |
| | .6612 |

INITIAL MEAN VALUE SLEW-(V) = $2.57 \times 10^{+1}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 4 DEVICES TEST DATE 05-27-83

REF: JPL LOG 0873-2 DATE CODE 8234DM



MEAN ICHG+(MA)

DOSE, rads(Si) Co⁶⁰ Gammas

(4) ICHG+ (VOUT-VIN=-2V) IN MA: VS DOSE

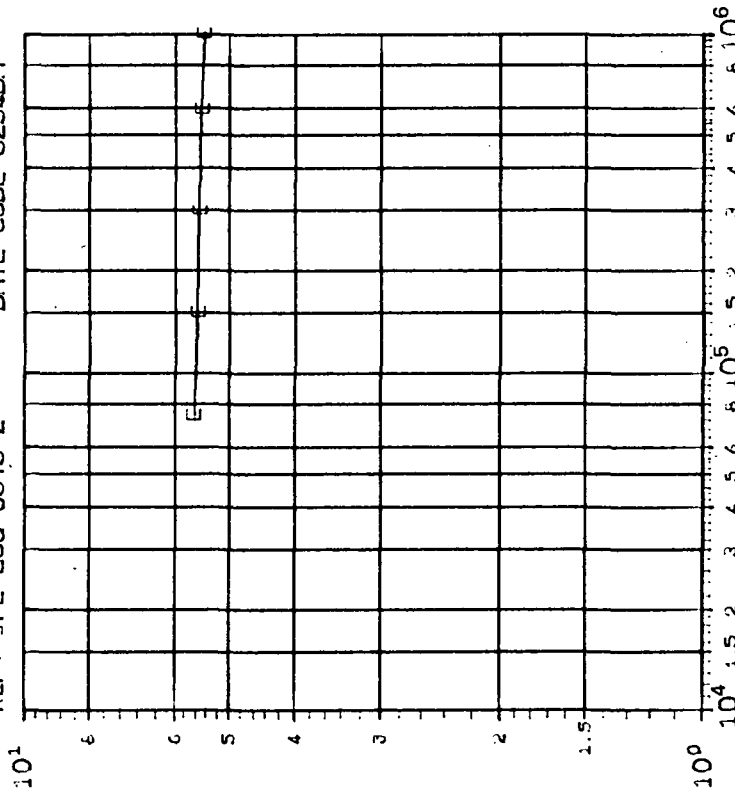
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 75 | 150 | 300 | 600 1000 |
| D | .0895 | .1105 | .0953 | .1011 .1165 |

INITIAL MEAN VALUE ICHG+(MA) = $5.39 \times 10^{+3}$

DEVICE TYPE: LF198 FET SAMPLE & HOLD

MFG: AMD 4 DEVICES TEST DATE 05-27-83

REF: JPL LOG 0873-2 DATE CODE 8234DM



MEAN ICHG-(MA)

DOSE, rads(Si) Co⁶⁰ Gammas

(5) ICHG- (VOUT-VIN=-2V) IN MA: VS DOSE

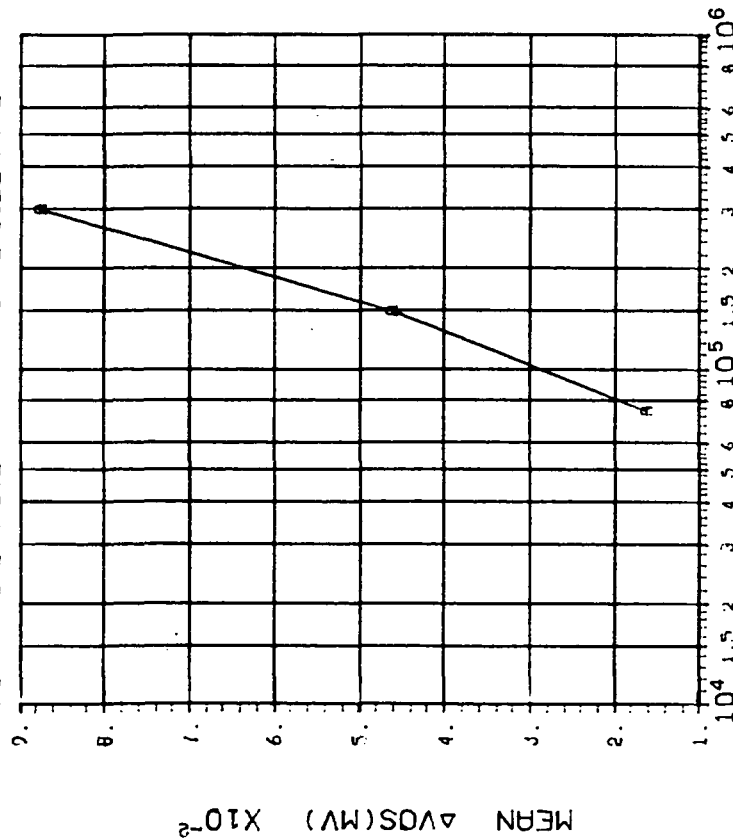
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 75 | 150 | 300 | 600 1000 |
| E | .1530 | .1503 | .1516 | .1623 .2087 |

INITIAL MEAN VALUE ICHG-(MA) = $5.69 \times 10^{+3}$

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-1 DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

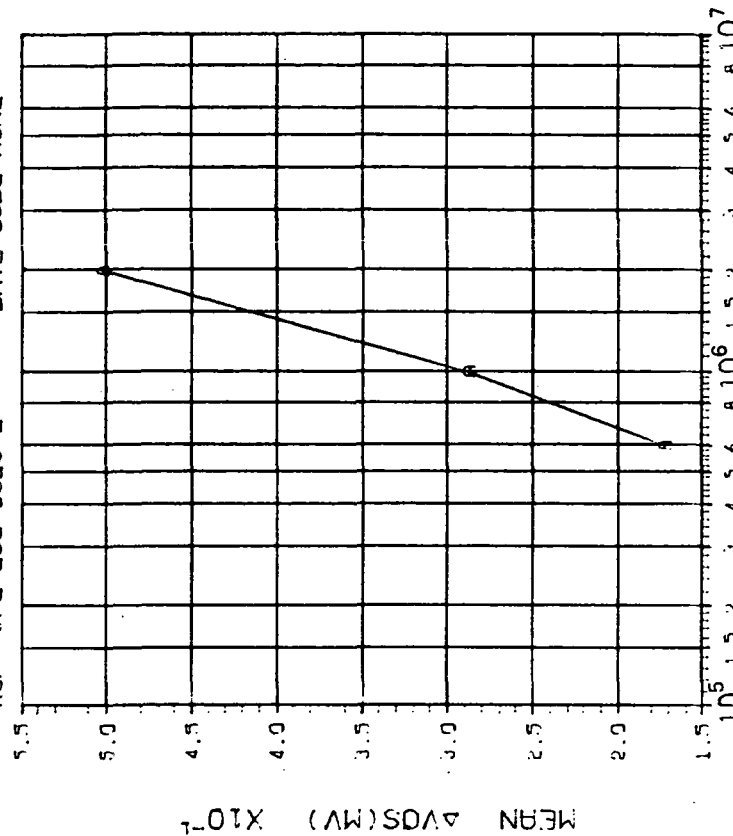
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 |
| A | .0082 | .0321 |
| | | .1066 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-2 DATE CODE NONE

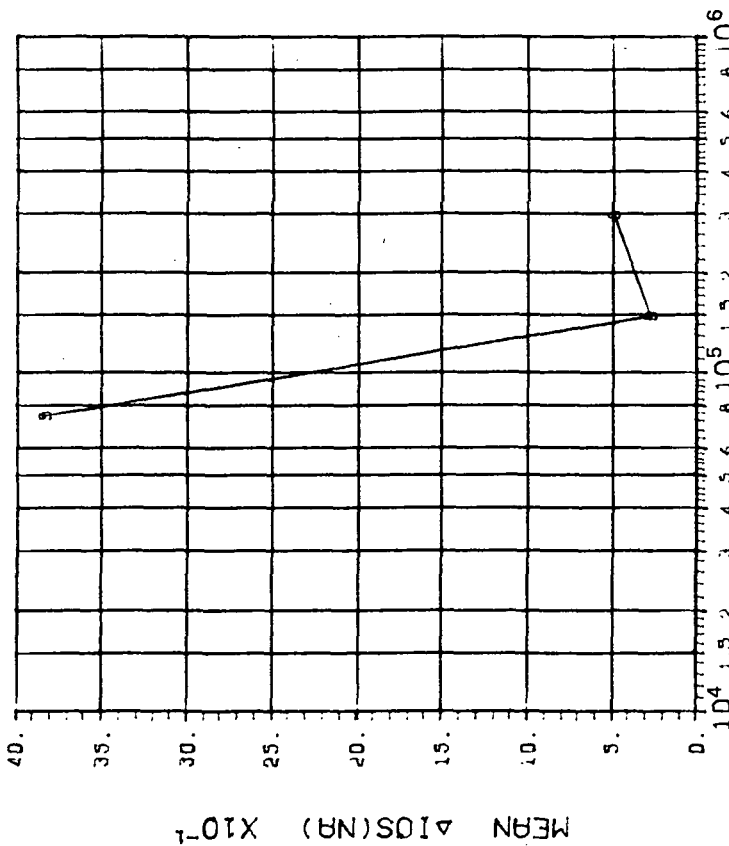


DOSE, rads(Si) Co⁶⁰ Gammas

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 600 | 1000 |
| A | .1797 | .2226 |
| | | .2697 |

DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 3 DEVICES TEST DATE 03-28-83
 REF: JPL LOG 0826-1 DATE CODE NONE

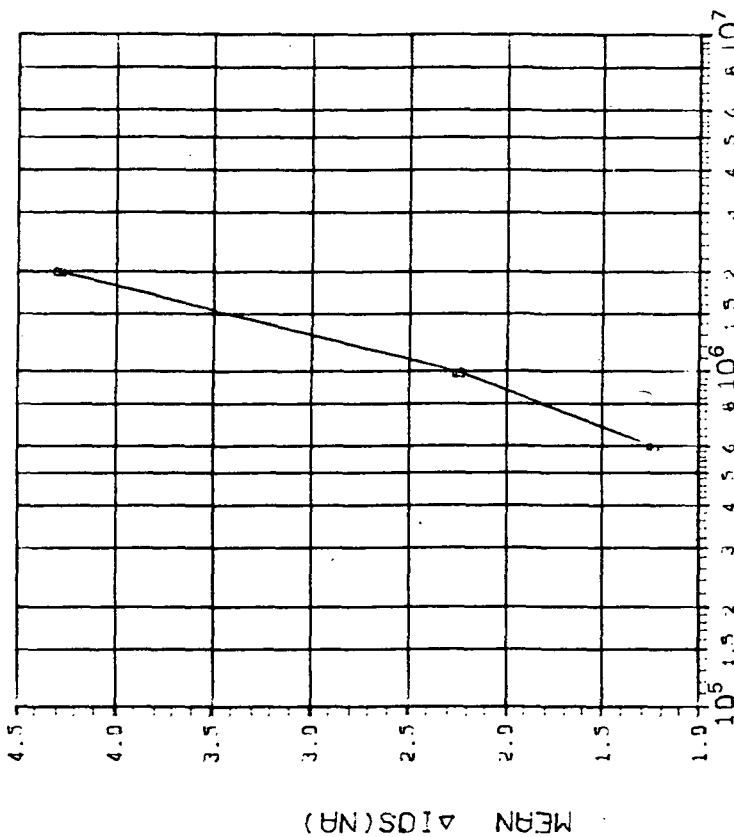


DOSE, rads(Si) Co⁶⁰ Gammas

(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| 6.407 .0650 .3542 | |

DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 3 DEVICES TEST DATE 03-28-83
 REF: JPL LOG 0826-2 DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

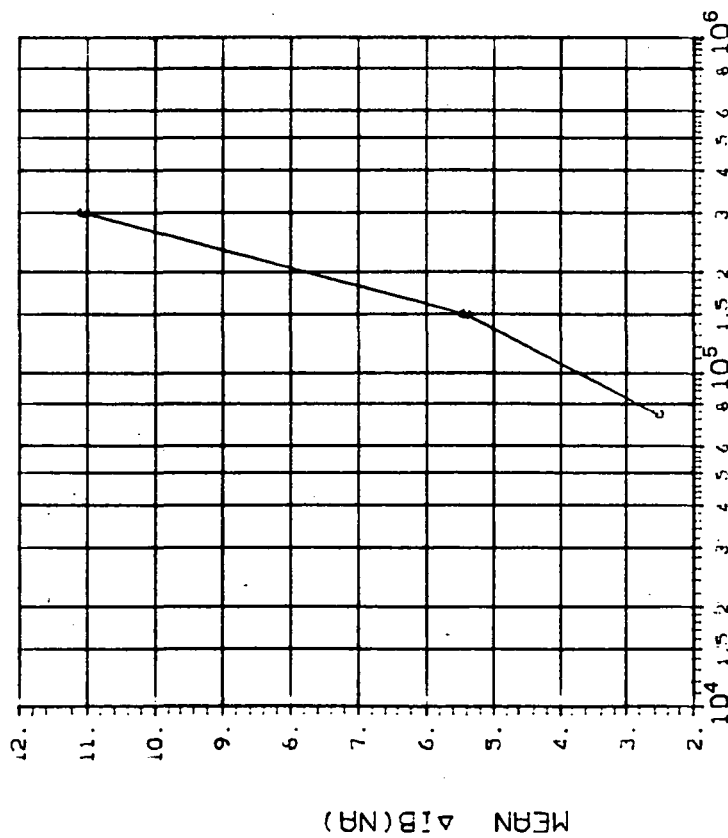
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 |
| | 1000 |
| | 2000 |
| .5419 1.270 2.635 | |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-1 DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

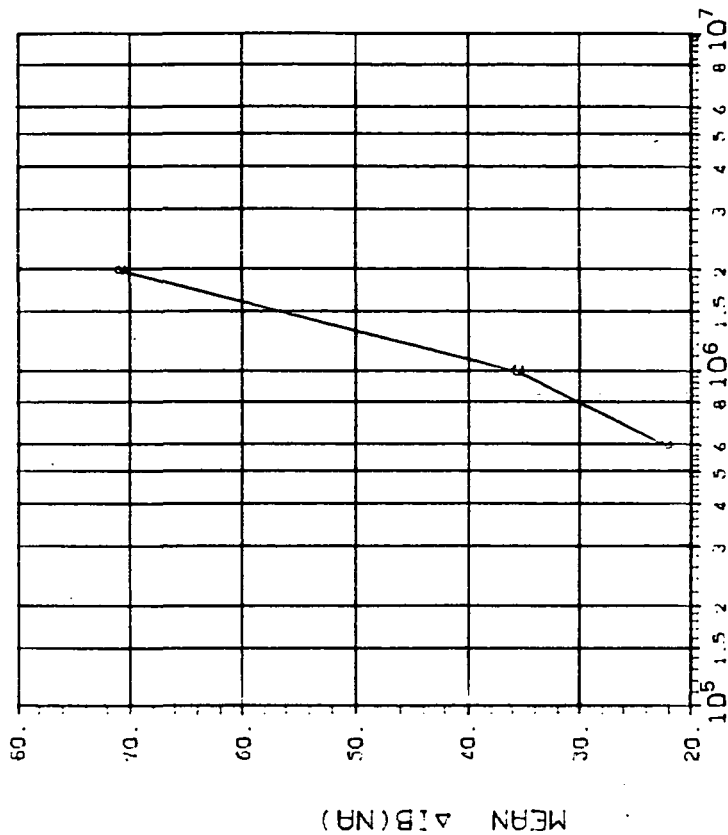
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| .9637 2.242 4.259 | |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-2 DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

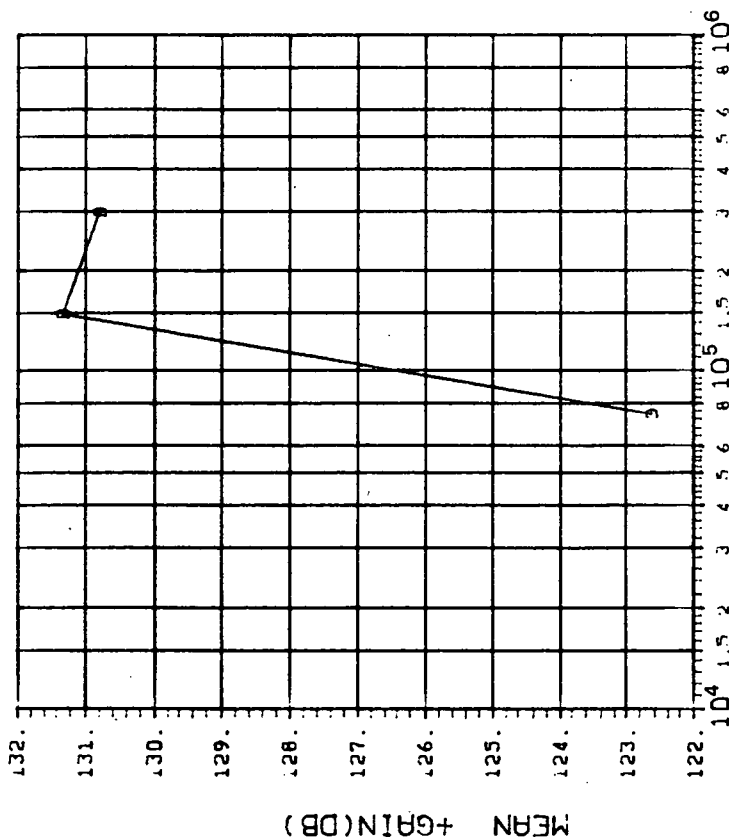
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| -C- | 600 |
| | 1000 |
| | 2000 |
| 7.579 12.02 22.10 | |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-1 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB (5.MA LOAD, +10V): VS DOSE

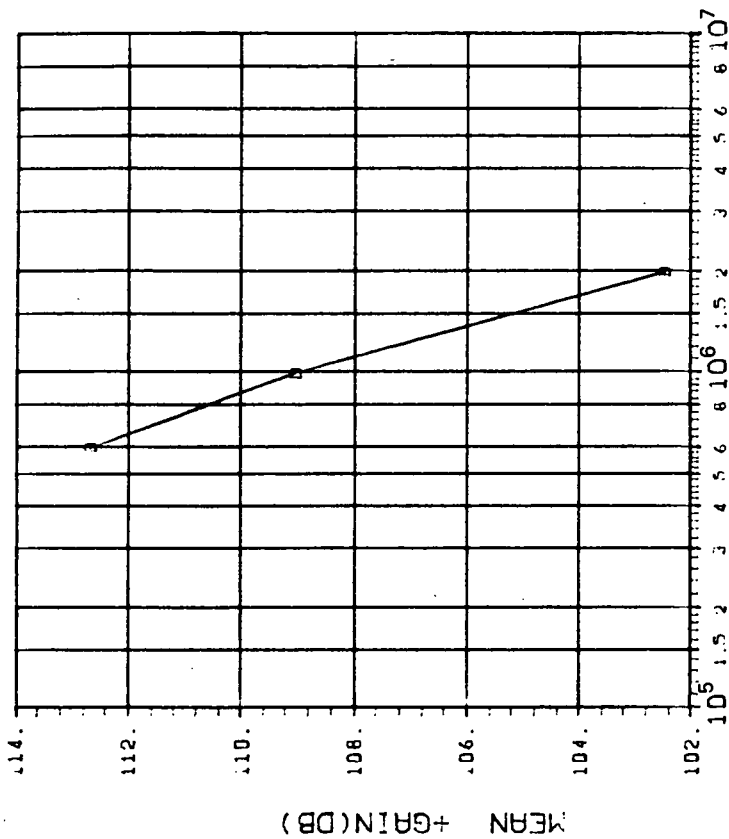
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 |
| | | 3.073 4.595 3.025 |

INITIAL MEAN VALUE +GAIN(DB) = $1.24 \times 10^{+2}$

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-2 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB (5.MA LOAD, +10V): VS DOSE

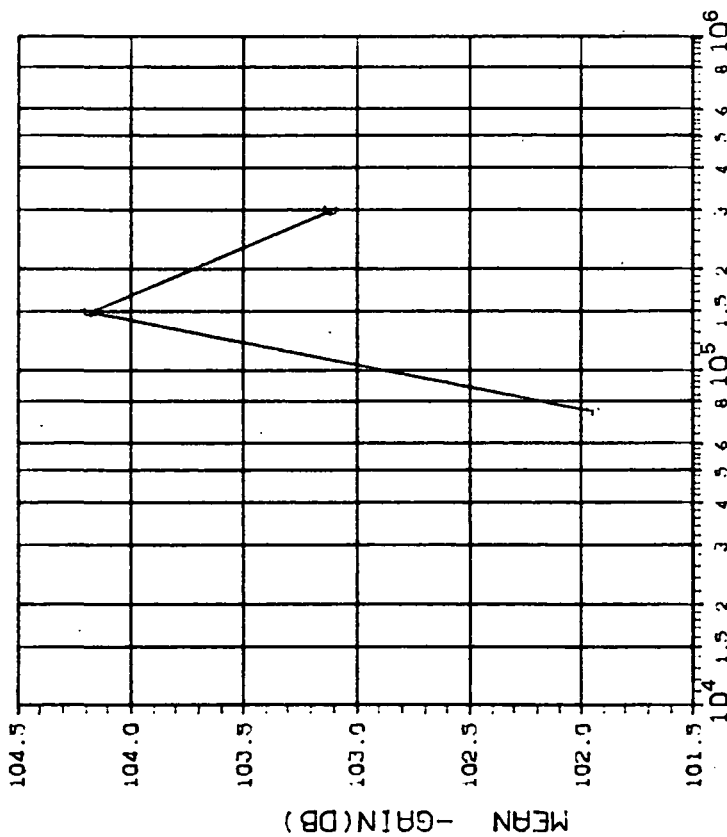
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 600 1000 2000 |
| | | 1.119 1.463 .5600 |

INITIAL MEAN VALUE +GAIN(DB) = $1.24 \times 10^{+2}$

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-1 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

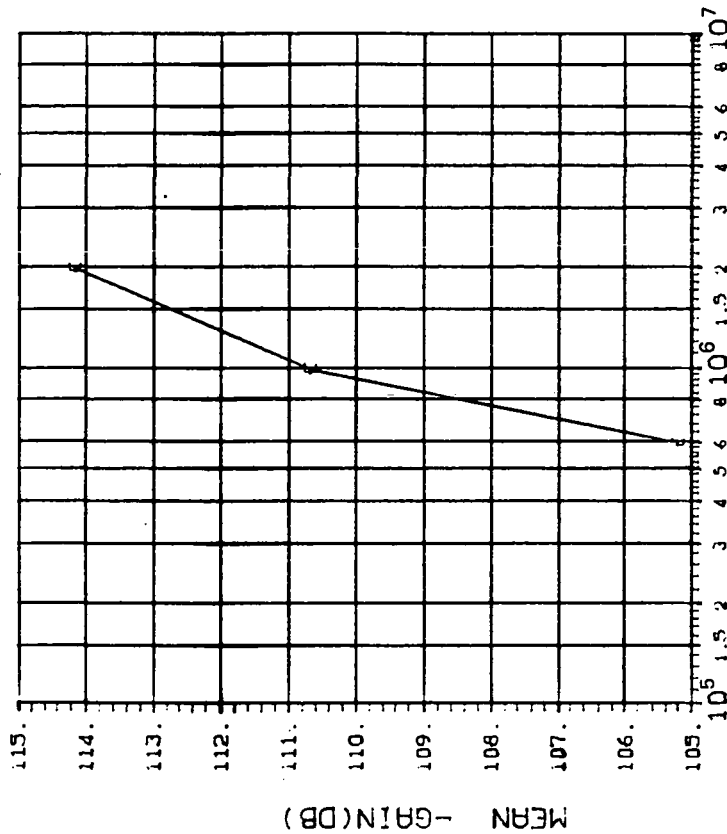
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 75 150 300 |
| | | .5437 2.407 .6216 |

INITIAL MEAN VALUE -GAIN(DB) = 1.01X10⁺²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-28-83

REF: JPL LOG 0826-2 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

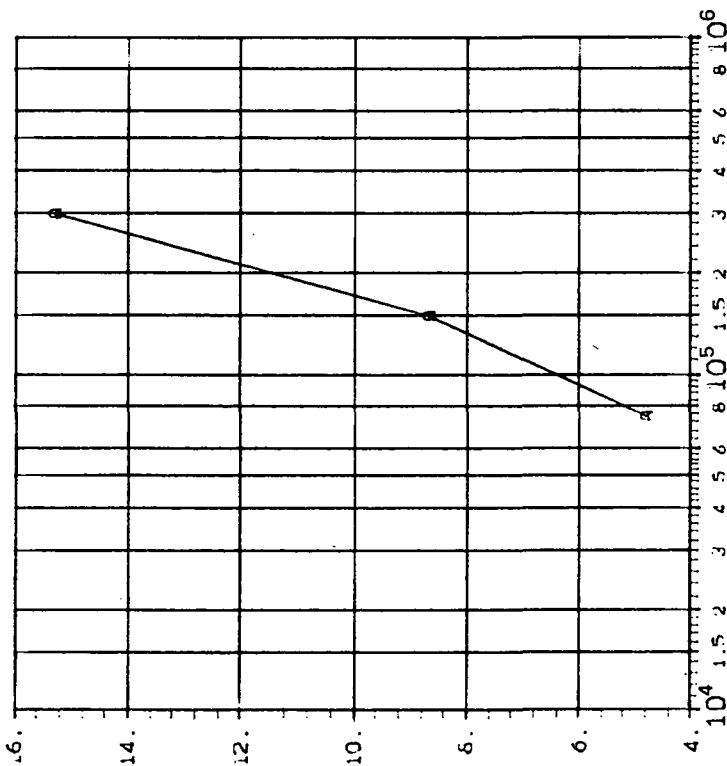
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 600 1000 2000 |
| | | .7921 2.357 2.224 |

INITIAL MEAN VALUE -GAIN(DB) = 1.01X10⁺²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: JPL LOG 0827-1 DATE CODE NONE



DOSE, rad(Si) 2.5 MeV electrons

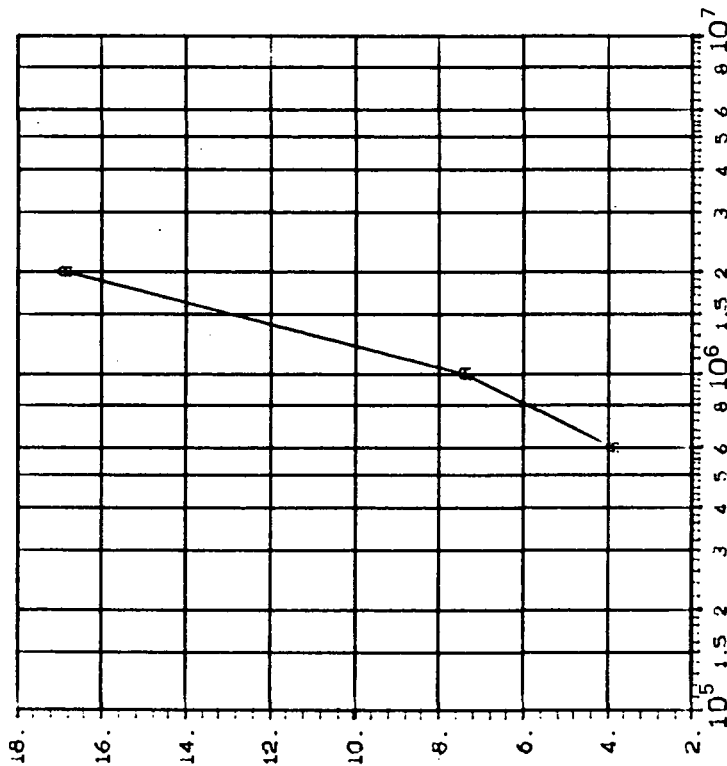
(1) $\Delta VOS(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| | .0112 .0317 .0960 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: JPL LOG 0827-2 DATE CODE NONE



DOSE, rad(Si) 2.5 MeV electrons

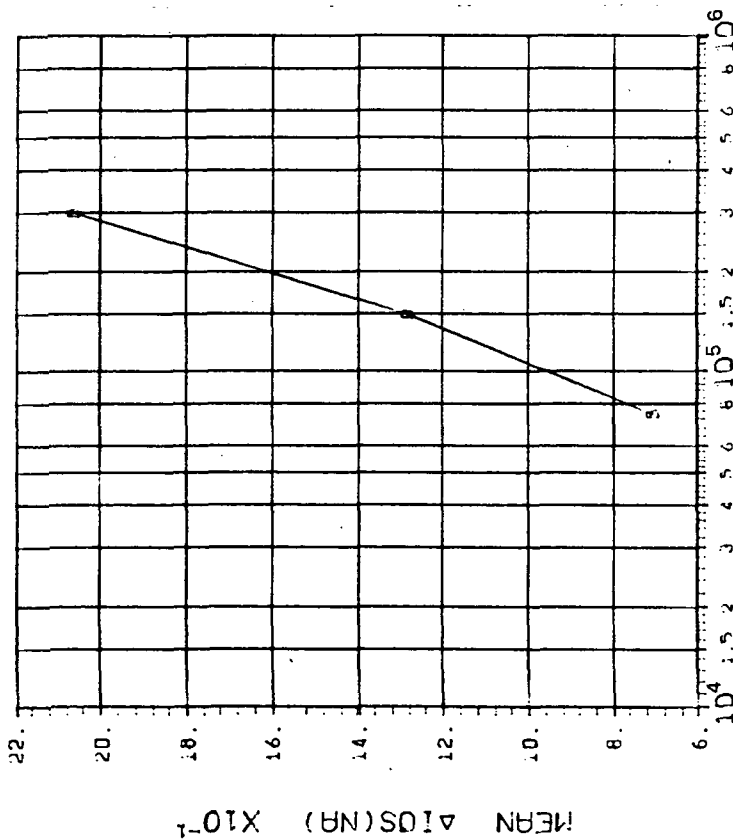
(1) $\Delta VOS(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| | .1474 .1936 .3438 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: JPL LOG 0827-1 DATE CODE NONE

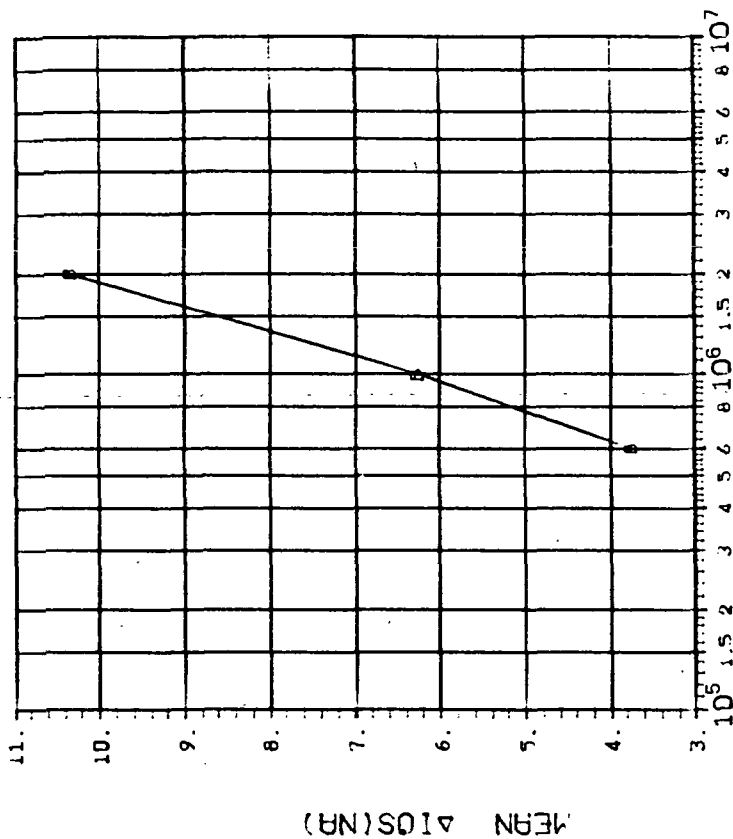


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| 9 | 75 150 300 |
| | .2116 .2110 .6971 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: JPL LOG 0827-2 DATE CODE NONE

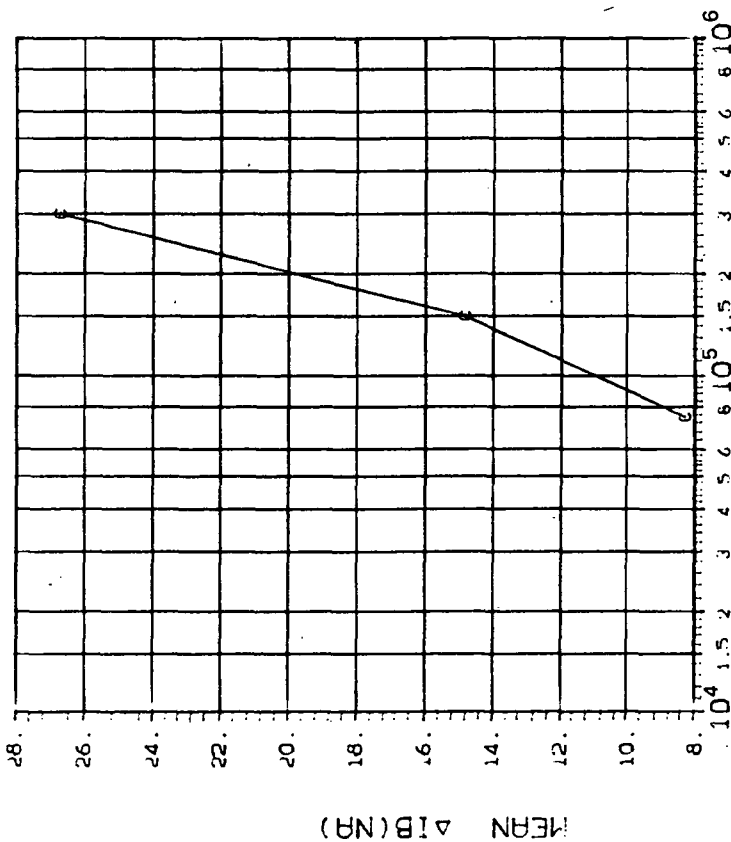


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| 9 | 600 1000 2000 |
| | 1.452 1.491 3.244 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: IPL LOG 0827-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

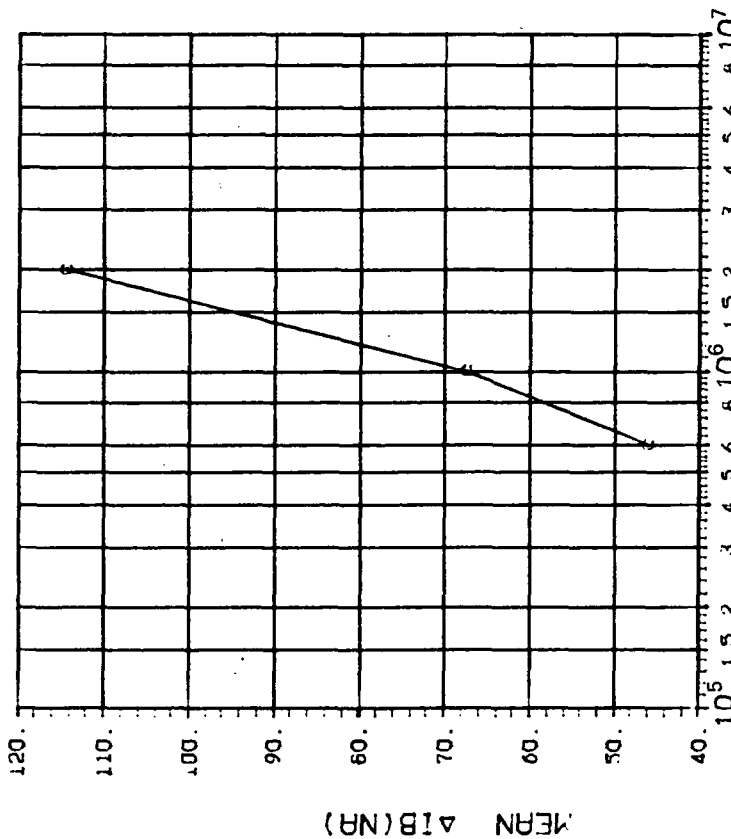
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 |
| C | 1.066 | 2.172 3.694 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: IPL LOG 0827-2 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

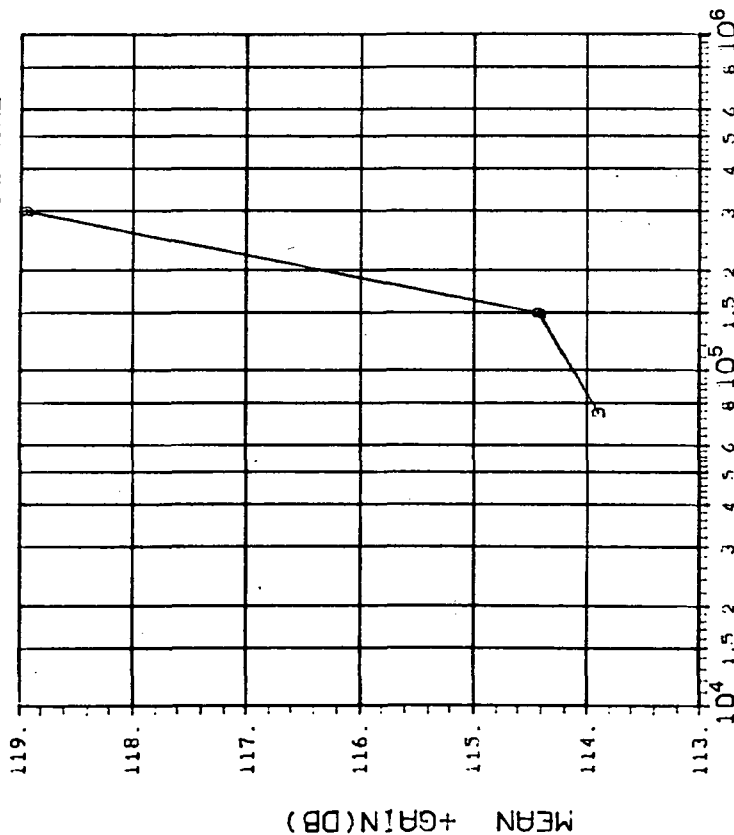
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 600 | 1000 2000 |
| C | 6.686 | 10.18 19.34 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: JPL LOG 0827-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(5.MA LOAD, +10V) : VS DOSE

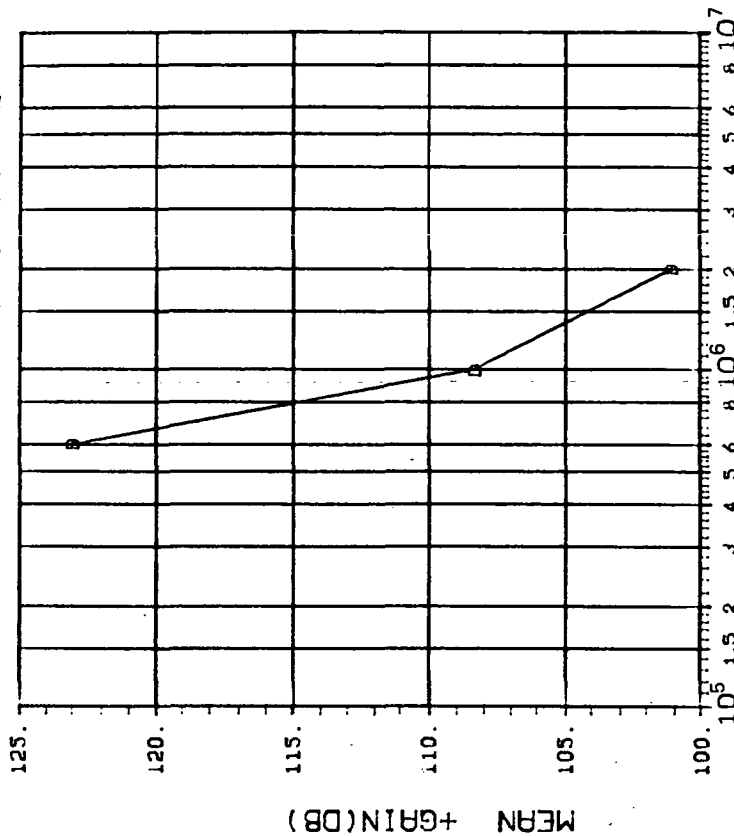
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 |
| | | .7470 .5284 2.768 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83

REF: JPL LOG 0827-2 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

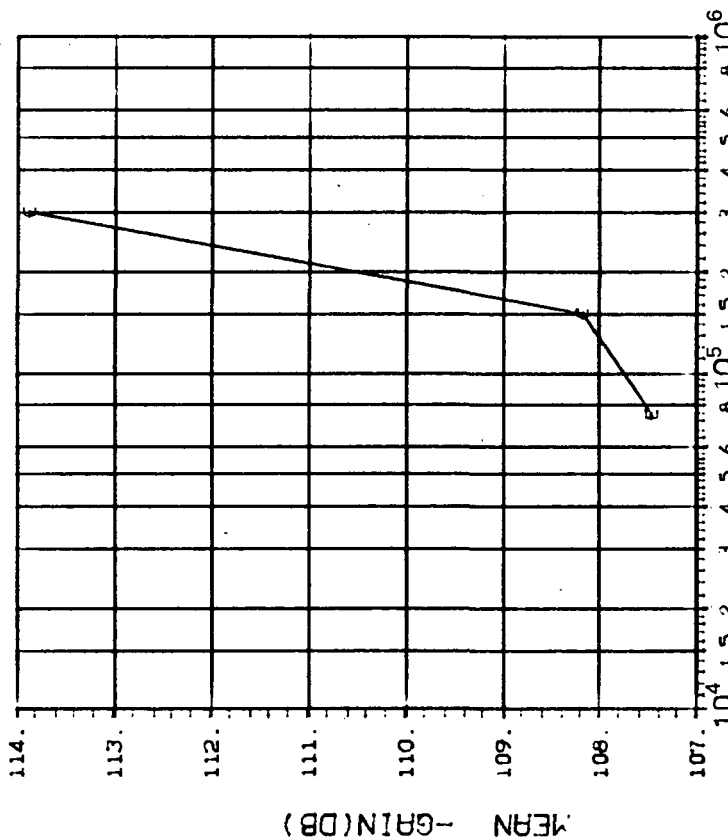
(4)+GAIN IN DB(5.MA LOAD, +10V) : VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 600 1000 2000 |
| | | 3.476 1.682 1.301 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83
REF: JPL LOG 0827-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

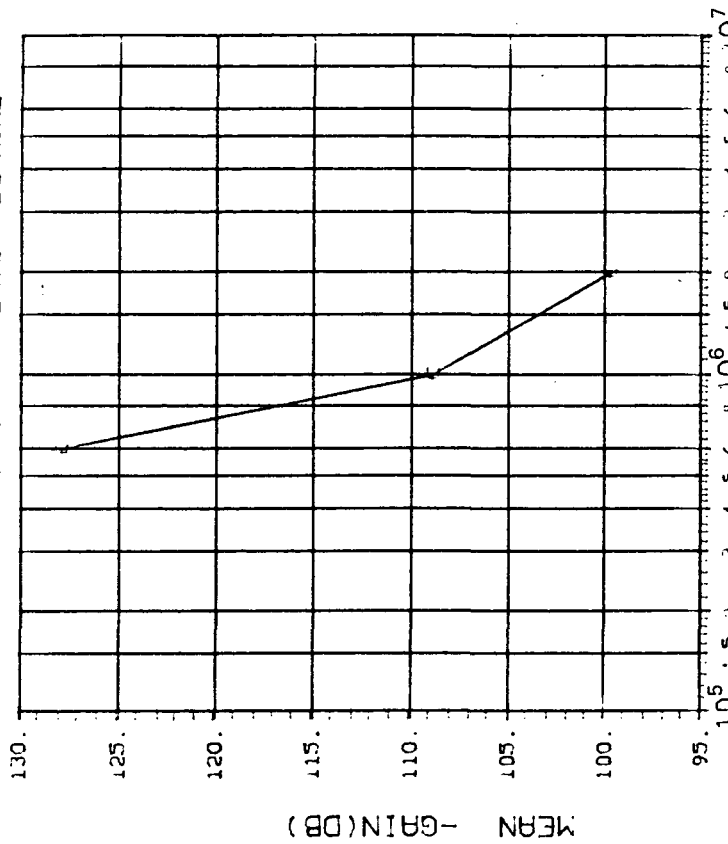
(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 75 150 300 |
| | | .9691 .2572 .2119 |

INITIAL MEAN VALUE -GAIN(DB) = 1.07X10⁴²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-08-83
REF: JPL LOG 0827-2 DATE CODE NONE



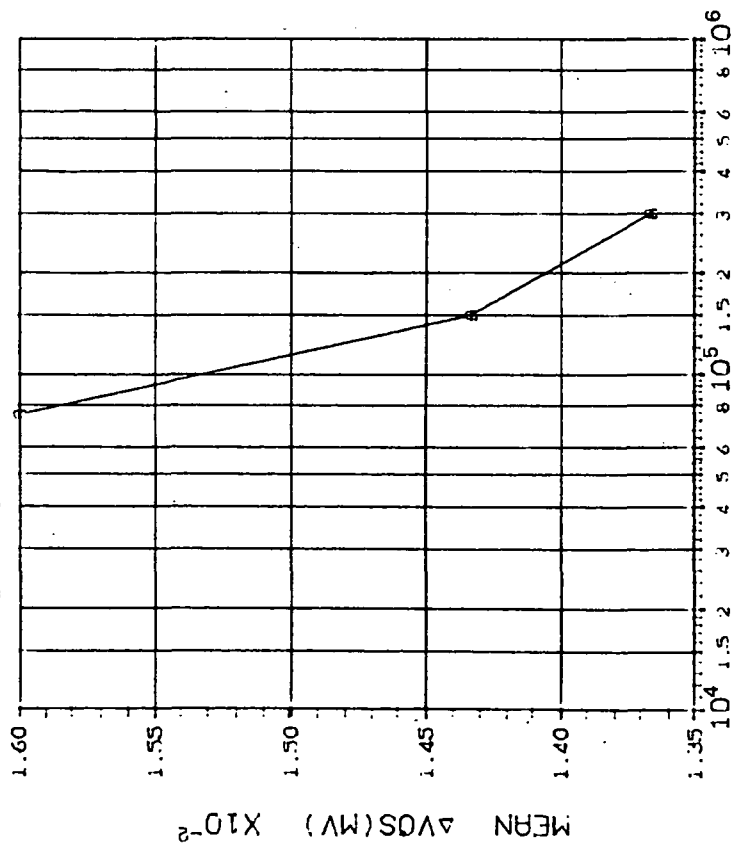
DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 600 1000 2000 |
| | | 6.316 3.567 1.636 |

INITIAL MEAN VALUE -GAIN(DB) = 1.07X10⁴²

DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 3 DEVICES TEST DATE 03-17-83
 REF: JPL LOG 0628--1 DATE CODE NONE

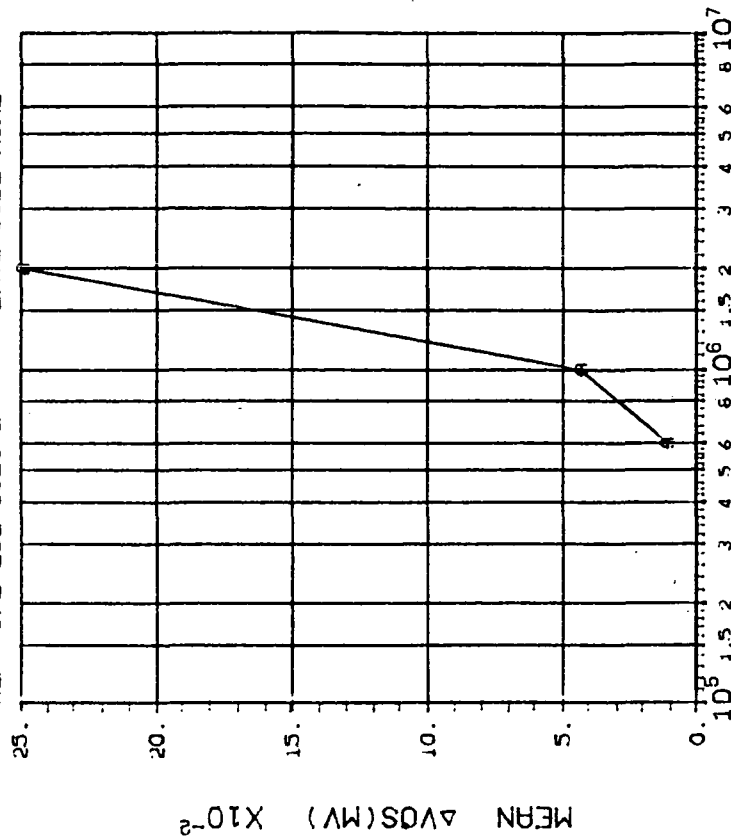


DOSE, rads(Si) Co⁶⁰ Gammas

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| .0219 .0144 .0068 | |

DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 3 DEVICES TEST DATE 03-17-83
 REF: JPL LOG 0628--2 DATE CODE NONE

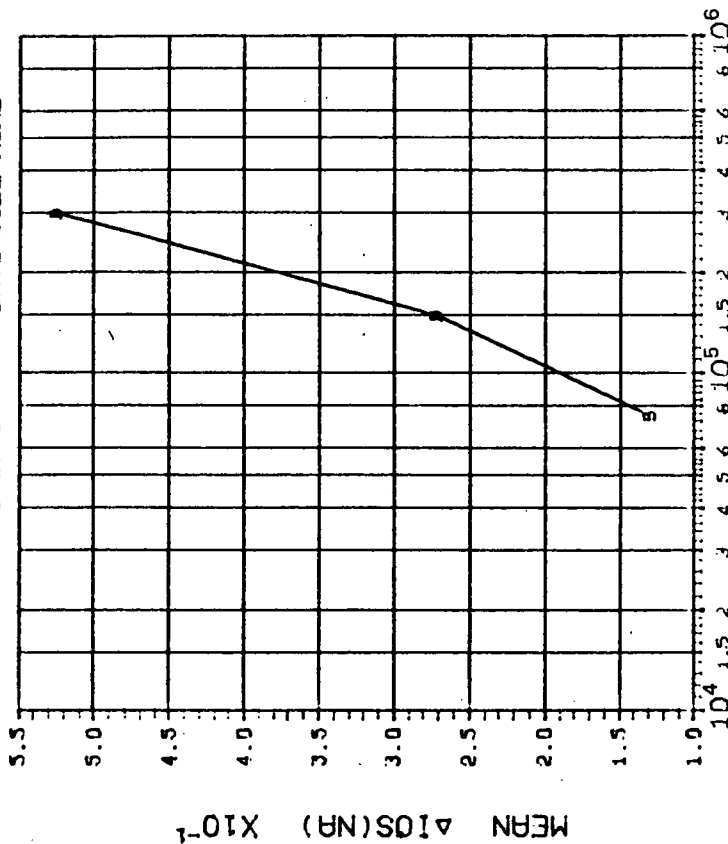


DOSE, rads(Si) Co⁶⁰ Gammas

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 |
| | 1000 |
| | 2000 |
| .0256 .0641 .5009 | |

DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 3 DEVICES TEST DATE 03-17-83
 REF: JPL LOG 0828-1 DATE CODE NONE

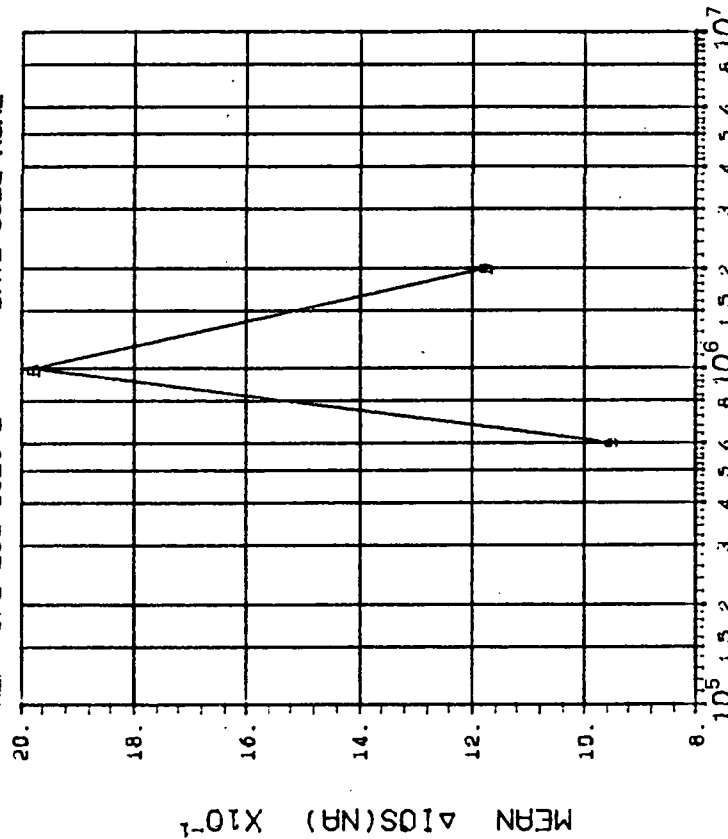


DOSE, rads(Si) Co 60 Gammas

(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| .0300 .0603 .1137 | |

DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 3 DEVICES TEST DATE 03-17-83
 REF: JPL LOG 0828-2 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

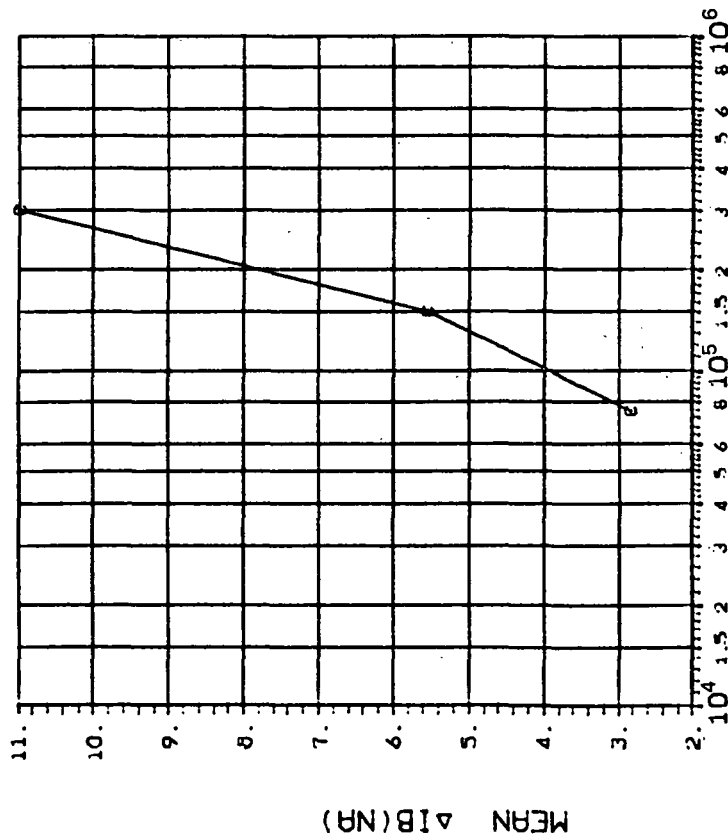
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 600 |
| | 1000 |
| | 2000 |
| .1537 .2040 4.910 | |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-17-83

REF: JPL LOG 0828-1 DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

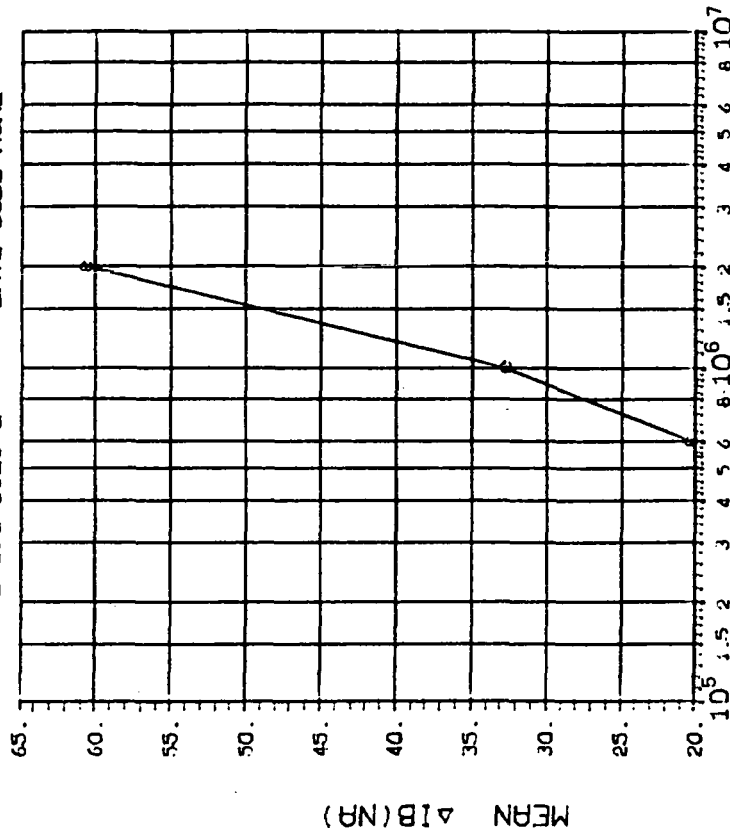
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| .2086 .4796 1.113 | |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-17-83

REF: JPL LOG 0828-2 DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

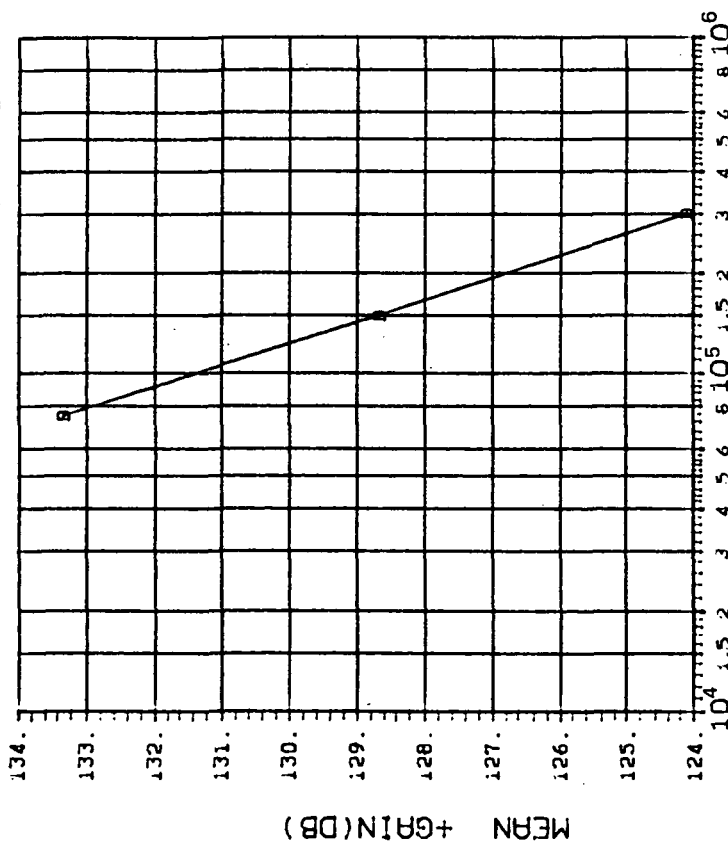
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| 1.975 3.160 4.996 | |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-17-83

REF: JPL LOG 0828-1 DATE CODE NONE



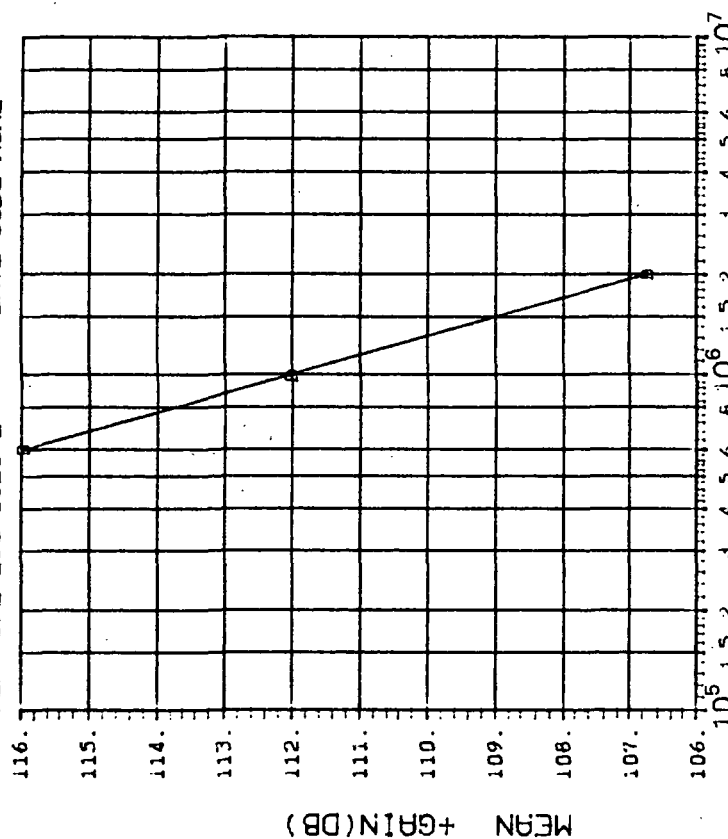
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|--------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 |
| | | 7.012 10.26 5.044 |

INITIAL MEAN VALUE +GAIN(DB) = $1.31 \times 10^{+2}$

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-17-83

REF: JPL LOG 0828-2 DATE CODE NONE



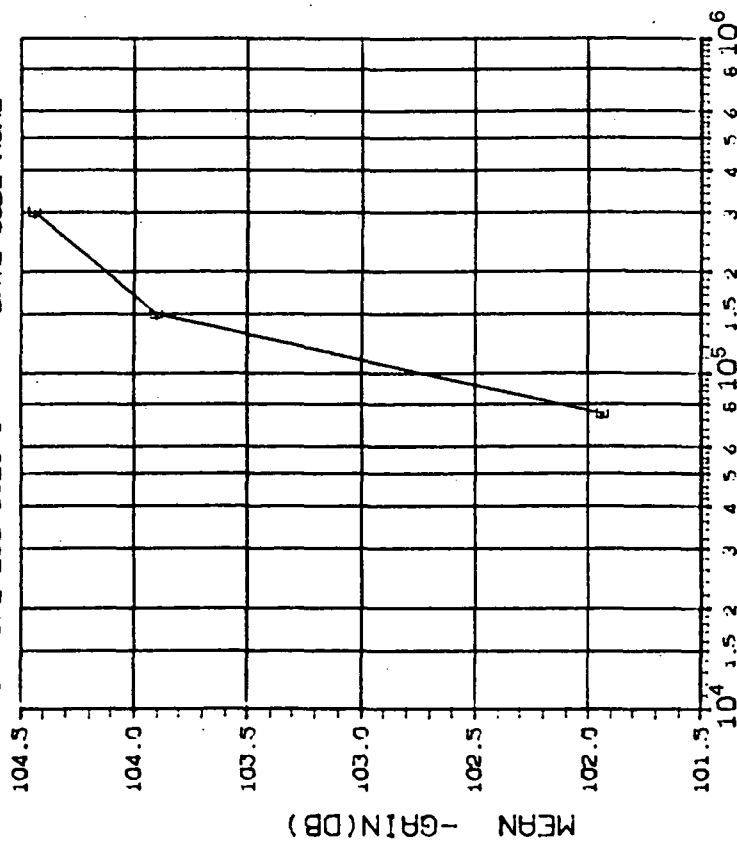
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|--------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 600 1000 2000 |
| | | 3.203 1.390 .3779 |

INITIAL MEAN VALUE +GAIN(DB) = $1.31 \times 10^{+2}$

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-17-83

REF: JPL LOG 0828-1 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

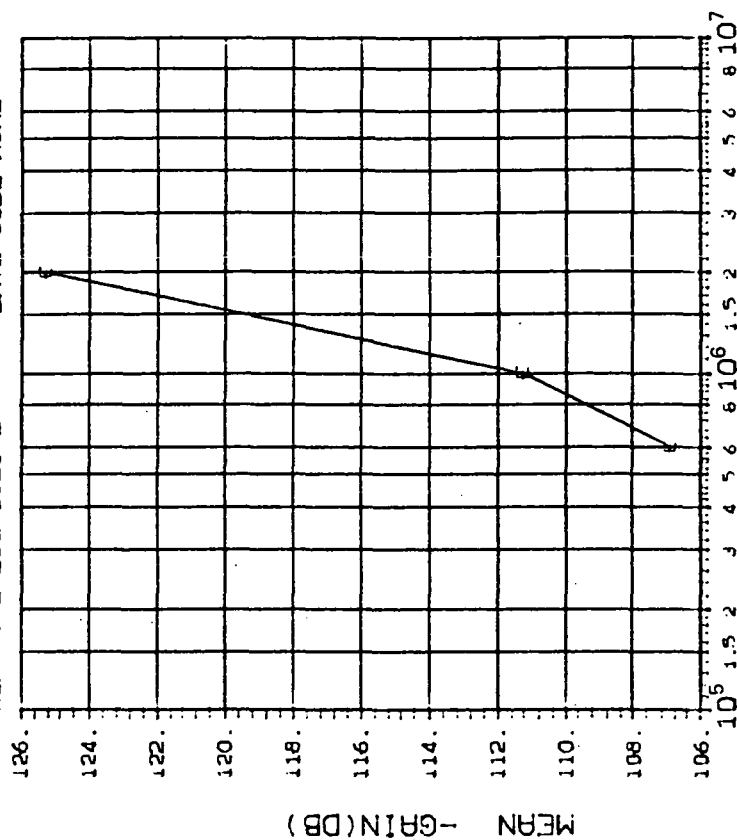
(S)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

INITIAL MEAN VALUE -GAIN(DB) = 1.05X10⁺²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 3 DEVICES TEST DATE 03-17-83

REF: JPL LOG 0828-2 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

(S)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

INITIAL MEAN VALUE -GAIN(DB) = 1.05X10⁺²

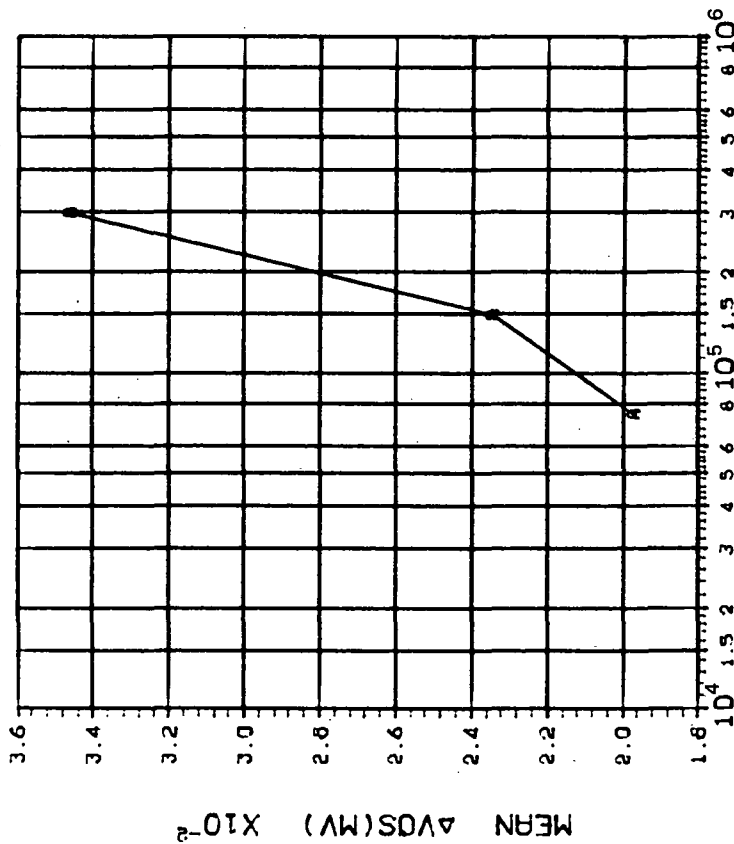
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|--------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 600 |
| | | 1000 |
| | | 2000 |
| | | .7083 2.357 4.625 |

INITIAL MEAN VALUE -GAIN(DB) = 1.05X10⁺²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

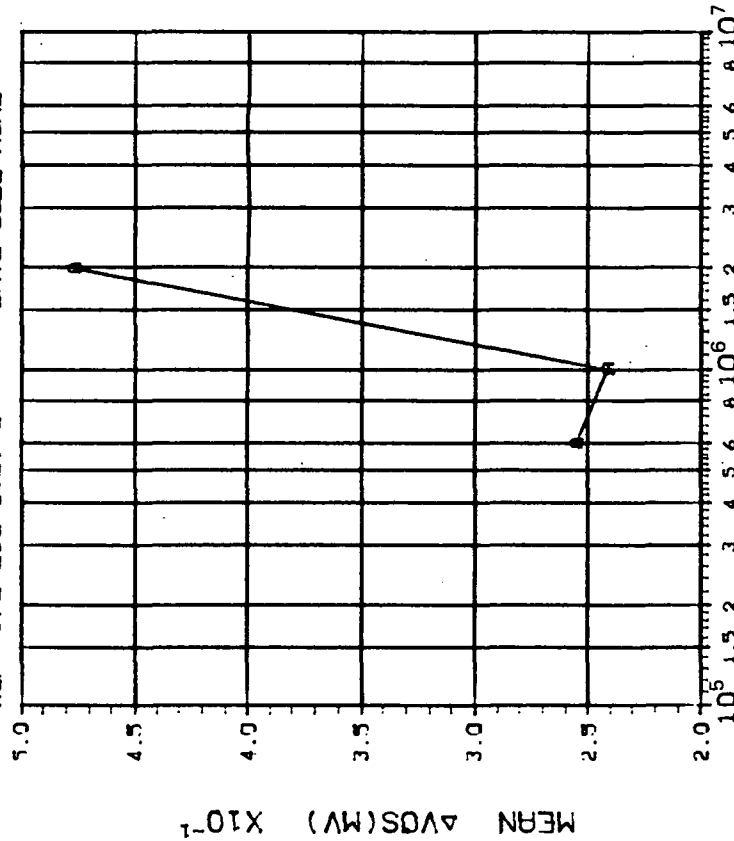
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| | .0149 .0223 .0426 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-2 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

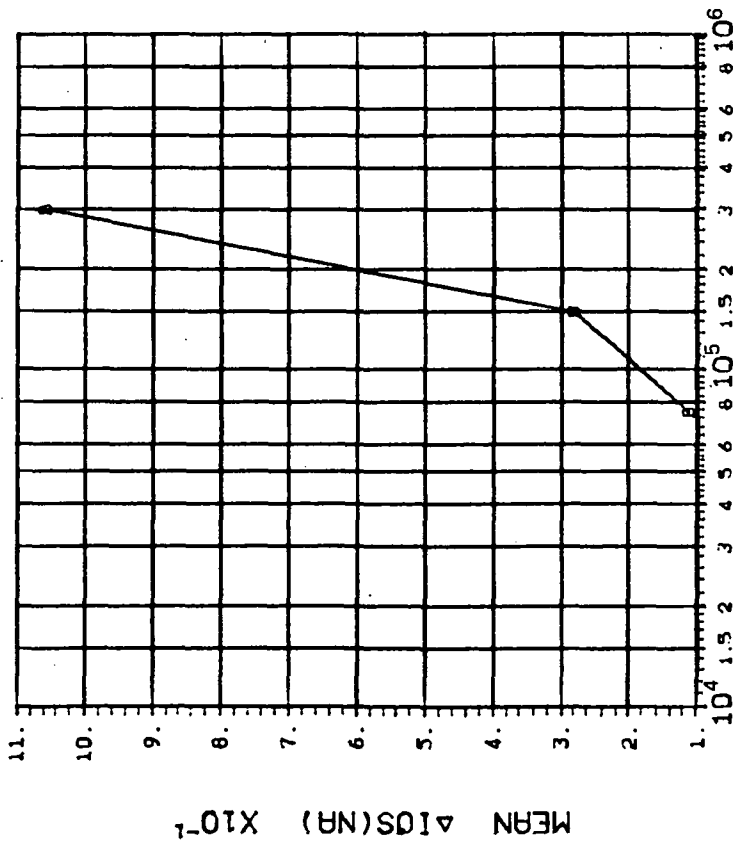
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| | .2473 .0369 .0791 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

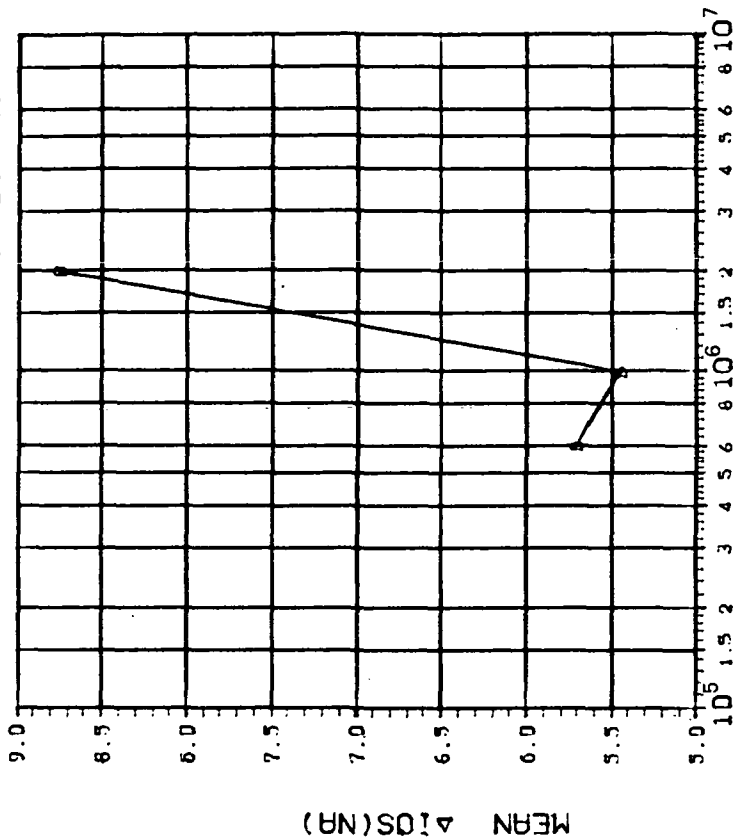
(2) $\Delta IOS(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 150 300 |
| B | .0985 .1553 .3010 |

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-2 DATE CODE NONE

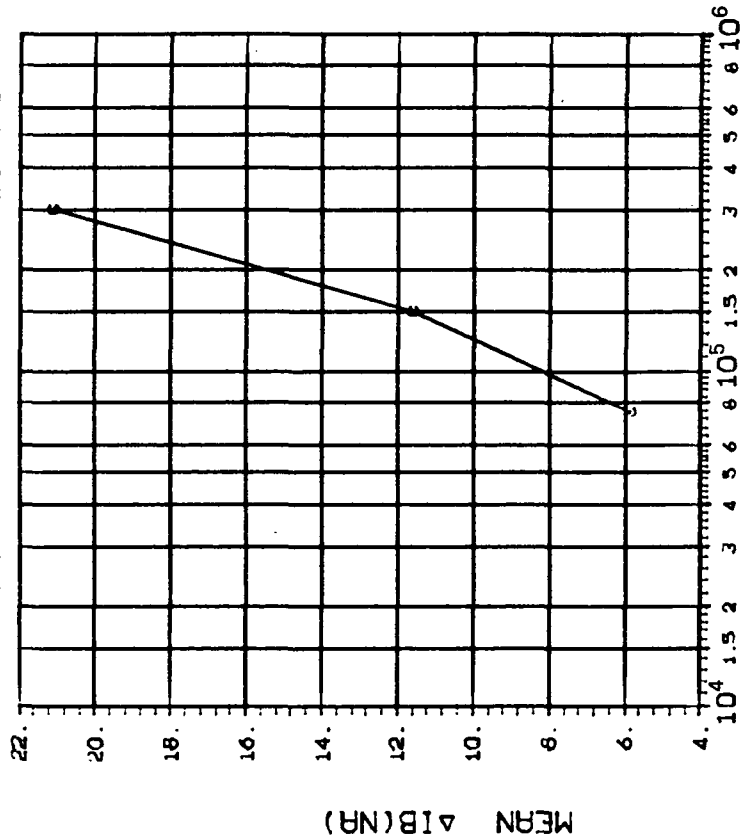


DOSE, rads(Si) 2.5 MeV electrons

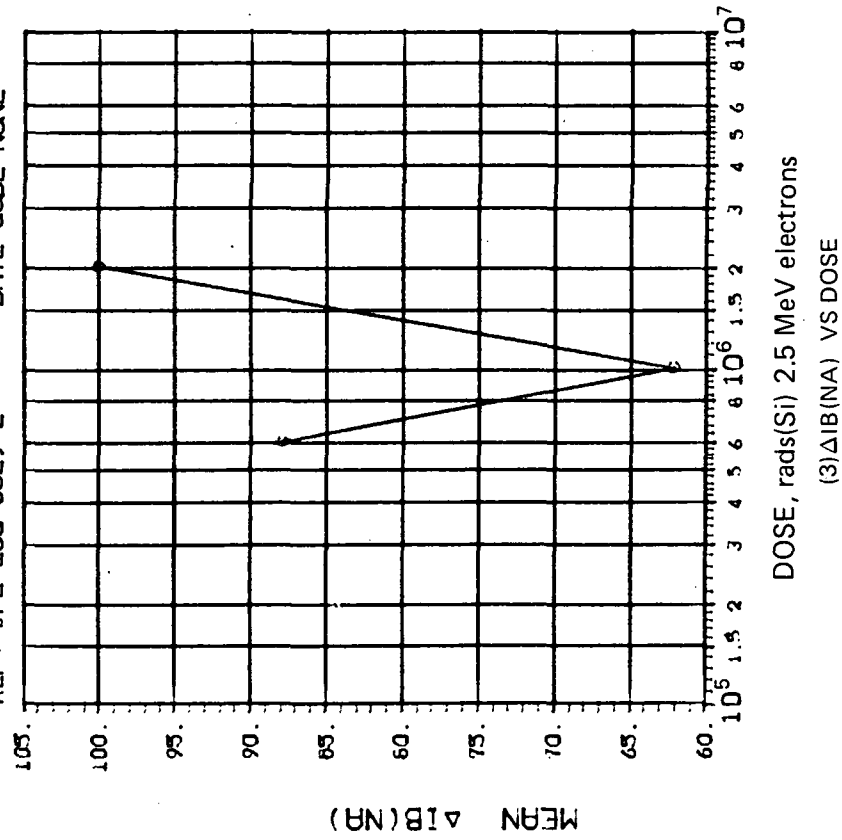
(2) $\Delta IOS(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| | 600 1000 2000 |
| B | 3.553 1.058 1.570 |

DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 4 DEVICES TEST DATE 03-07-83
 REF: JPL LOG 0829-1 DATE CODE NONE



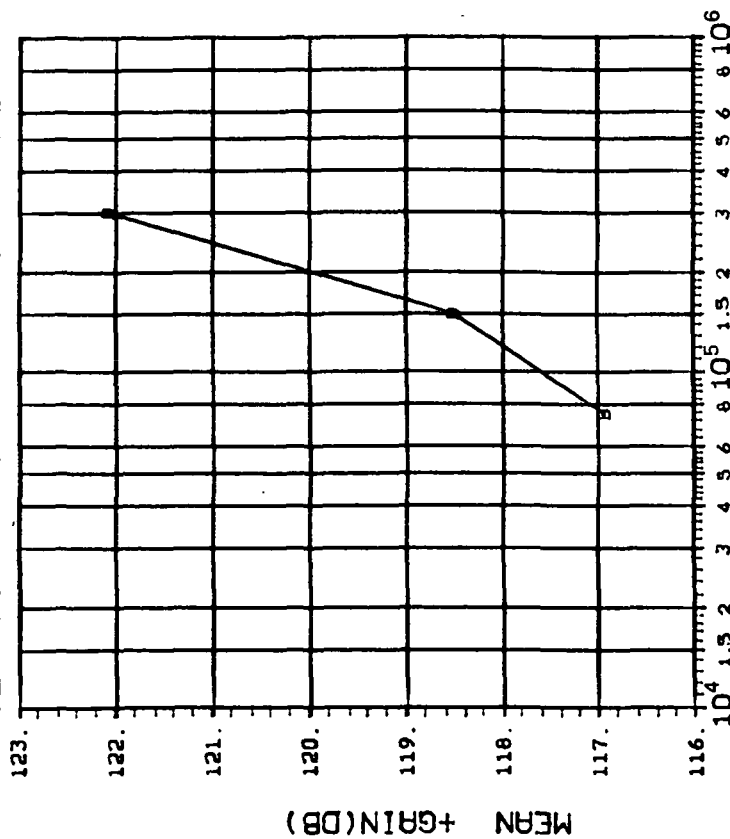
DEVICE TYPE: LM101 OP AMP RADHARD
 MFG: NSC 4 DEVICES TEST DATE 03-07-83
 REF: JPL LOG 0829-2 DATE CODE NONE



DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(5.MA LOAD,+10V): VS DOSE

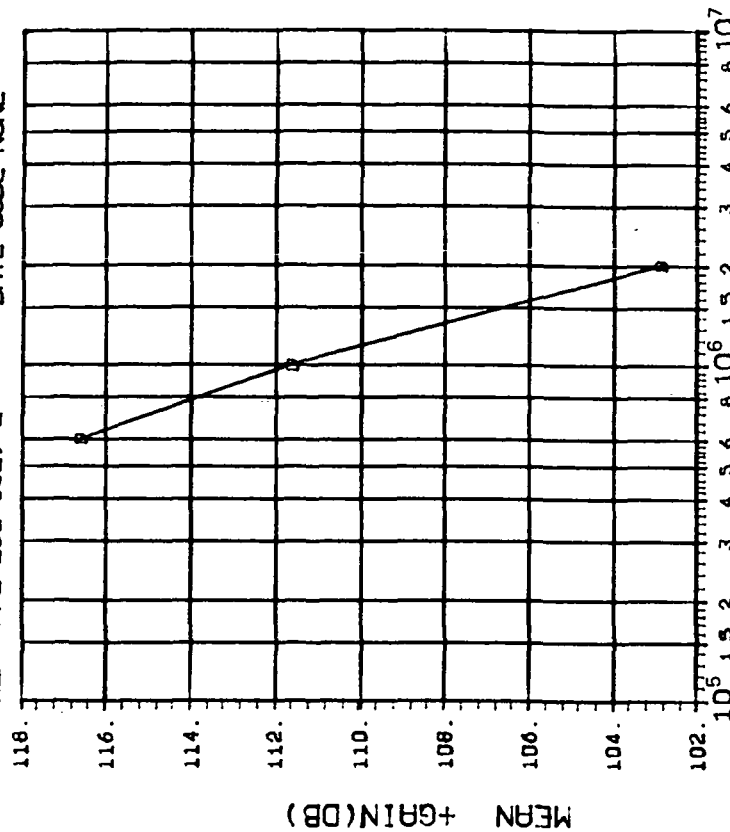
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 |
| | | 2.116 1.505 4.176 |

INITIAL MEAN VALUE +GAIN(DB) = 1.24X10¹²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-2 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(5.MA LOAD,+10V): VS DOSE

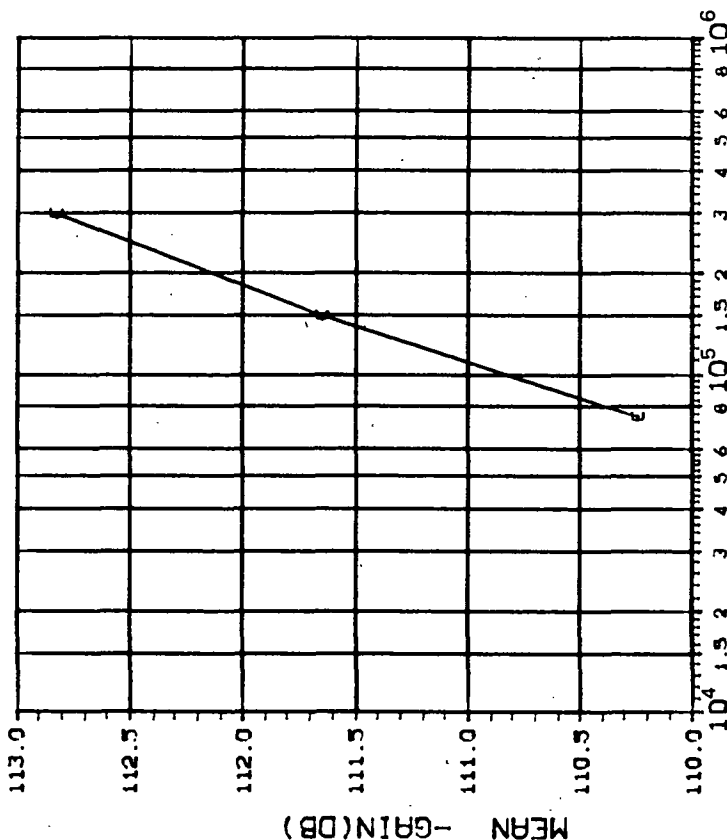
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 600 1000 2000 |
| | | 3.753 1.587 1.556 |

INITIAL MEAN VALUE +GAIN(DB) = 1.24X10¹²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-1 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(5.MA LOAD, -10V) : VS DOSE

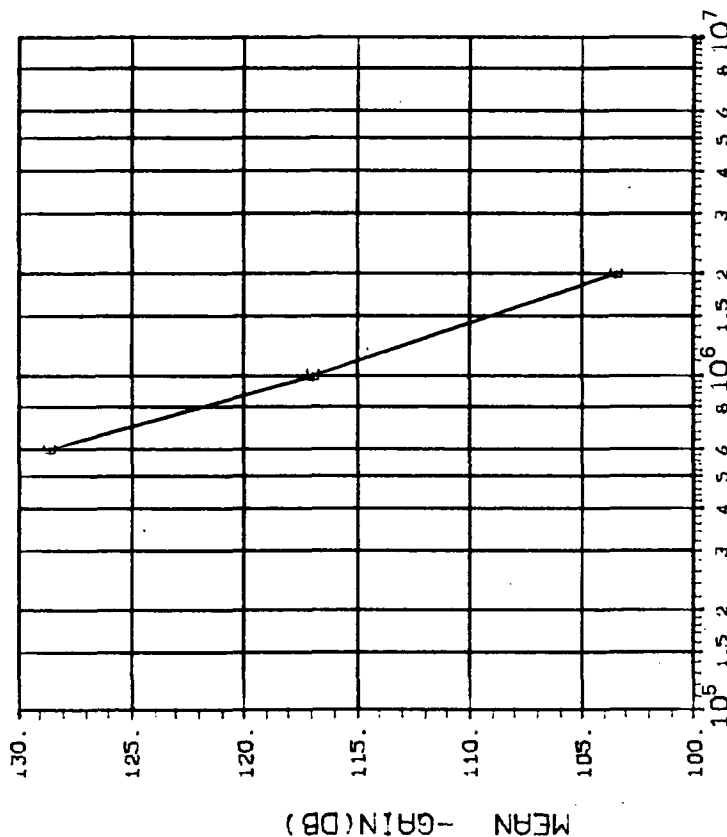
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 75 150 300 |
| | | .9752 1.661 2.304 |

INITIAL MEAN VALUE -GAIN(DB) = 1.05X10⁺²

DEVICE TYPE: LM101 OP AMP RADHARD

MFG: NSC 4 DEVICES TEST DATE 03-07-83

REF: JPL LOG 0829-2 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(5.MA LOAD, -10V) : VS DOSE

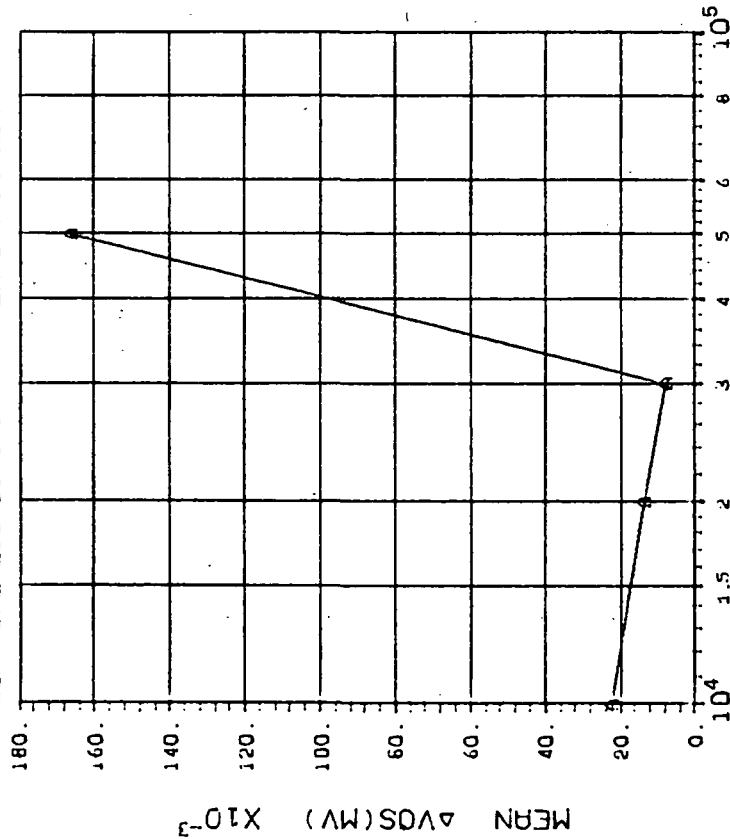
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 600 1000 2000 |
| | | 5.072 6.107 1.119 |

INITIAL MEAN VALUE -GAIN(DB) = 1.05X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

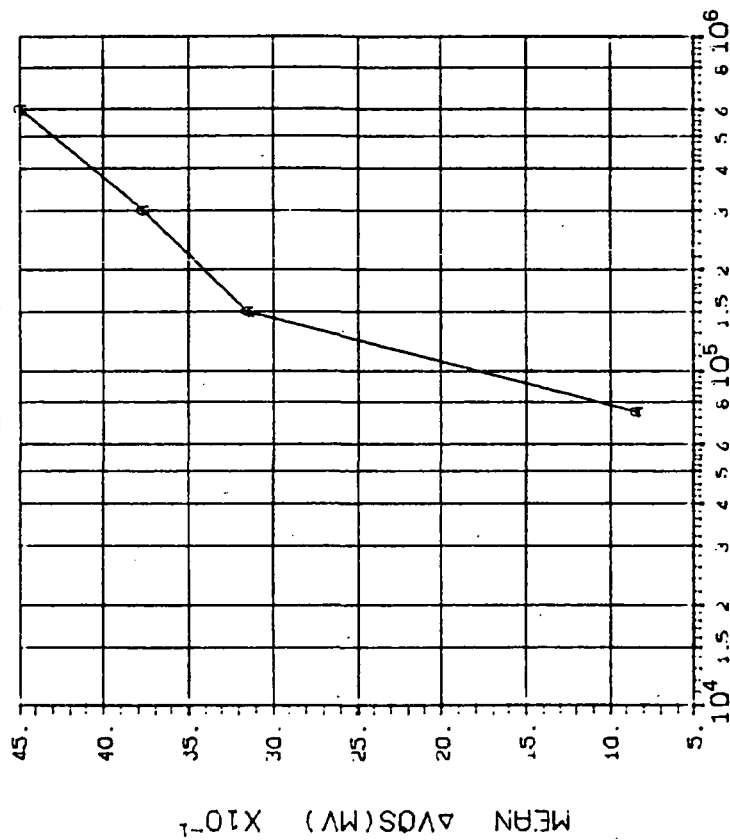
(1) $\Delta V_{OS}(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0235 | .0347 .0485 .1456 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

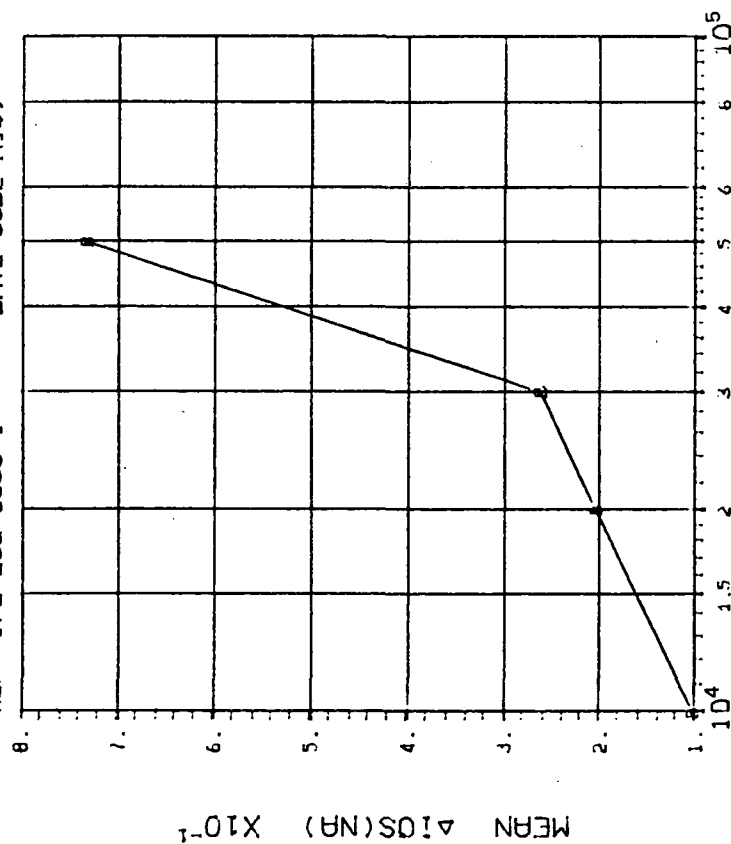
(1) $\Delta V_{OS}(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .7164 | 2.202 1.683 3.032 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(2) $\Delta IOS(NA)$: VS DOSE

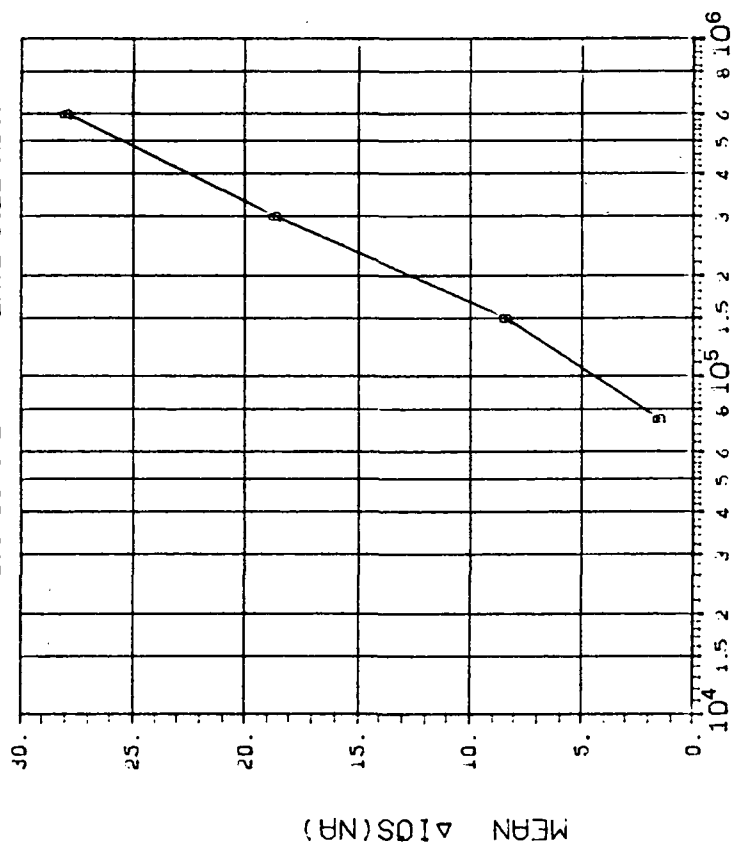
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 10 20 30 50 |
| B | .3103 .3890 .7721 1.191 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(2) $\Delta IOS(NA)$: VS DOSE

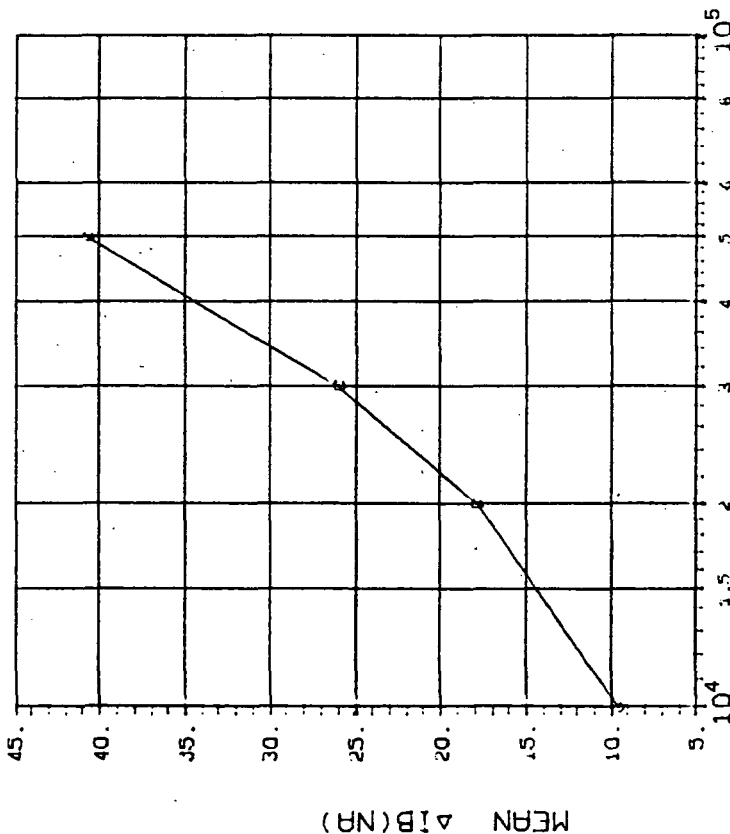
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 75 150 300 600 |
| B | 2.384 8.999 13.07 14.75 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

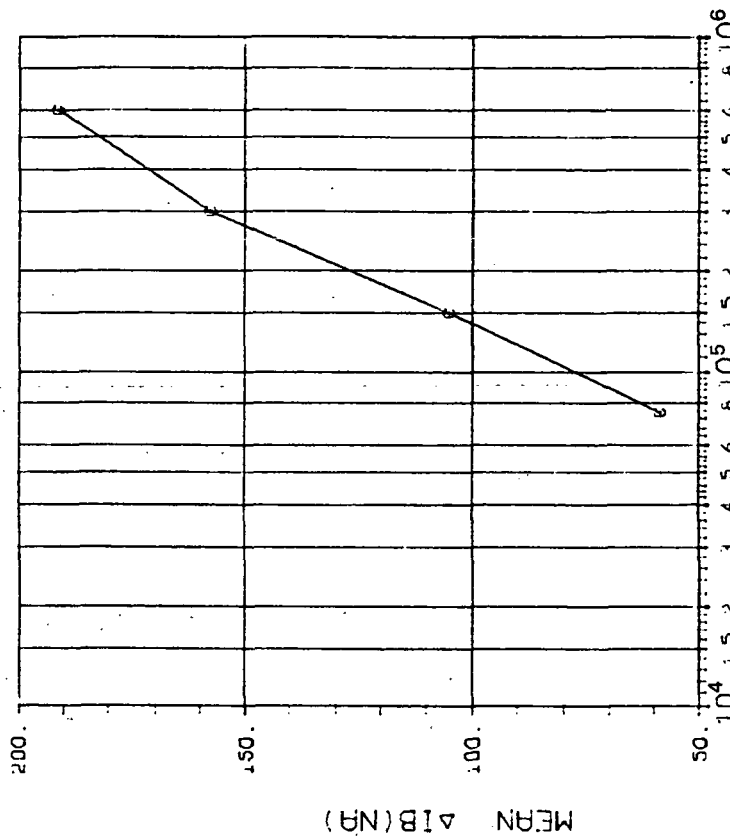
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| | 50 |
| | .6986 1.970 3.605 6.974 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

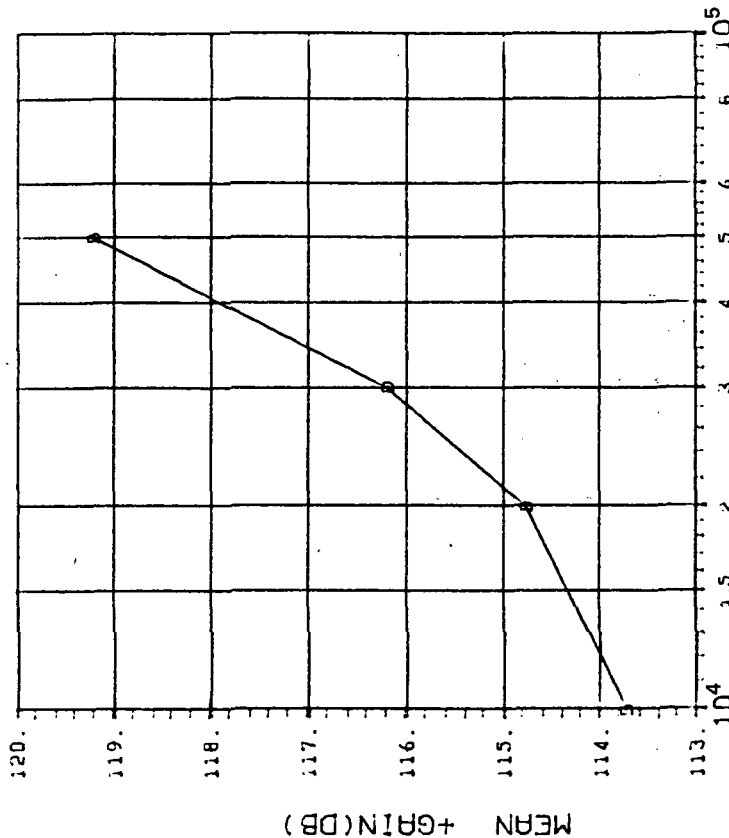
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 11.38 17.32 25.42 34.69 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(41)+GAIN IN DB(5.MA LOAD,+10V): VS DOSE

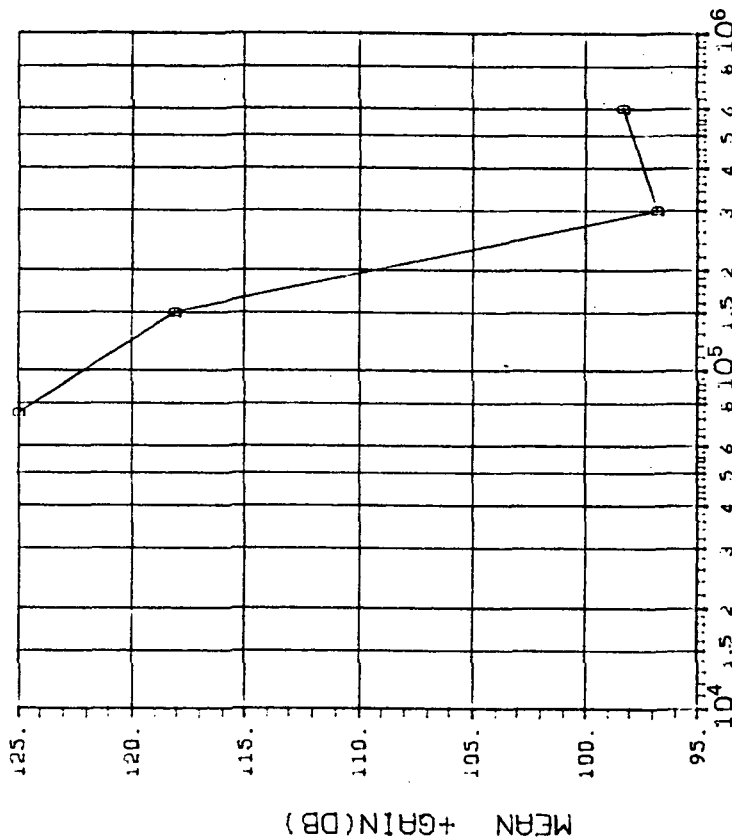
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 10 20 30 50 |
| | | 1.202 .2346 2.655 3.017 |

INITIAL MEAN VALUE +GAIN(DB) = $1.14 \times 10^{+2}$

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(5.MA LOAD,+10V): VS DOSE

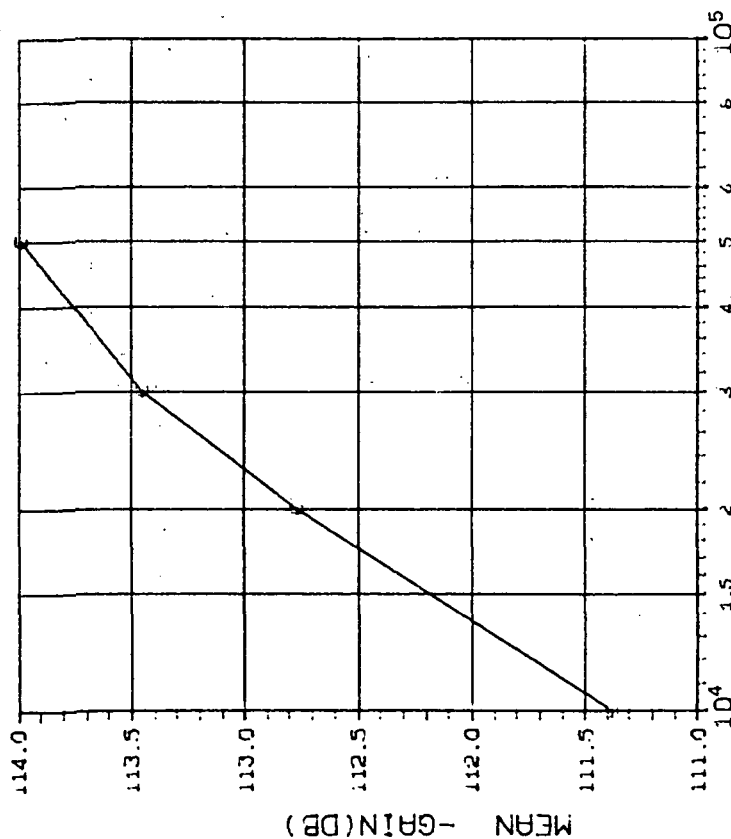
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 600 |
| | | 6.625 19.30 10.25 15.91 |

INITIAL MEAN VALUE +GAIN(DB) = $1.14 \times 10^{+2}$

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-63

REF: JPL LOG 0856-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

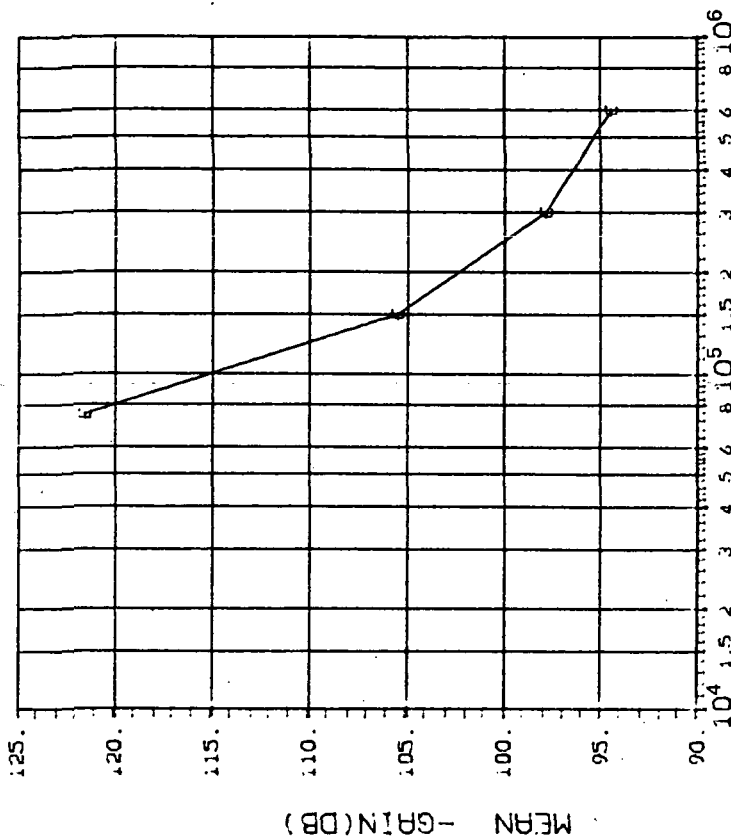
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|-------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 1.414 .4363 .3955 .3550 |

INITIAL MEAN VALUE -GAIN(DB) = 1.12×10^{12}

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0856-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

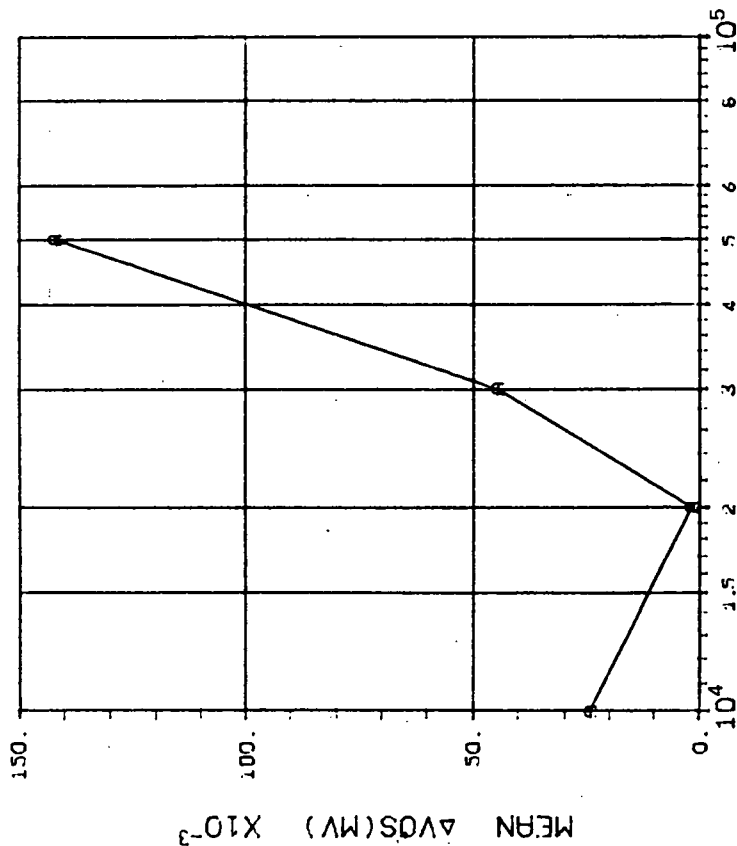
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|-------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 3.284 9.533 9.401 9.921 |

INITIAL MEAN VALUE -GAIN(DB) = 1.12×10^{12}

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0857-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

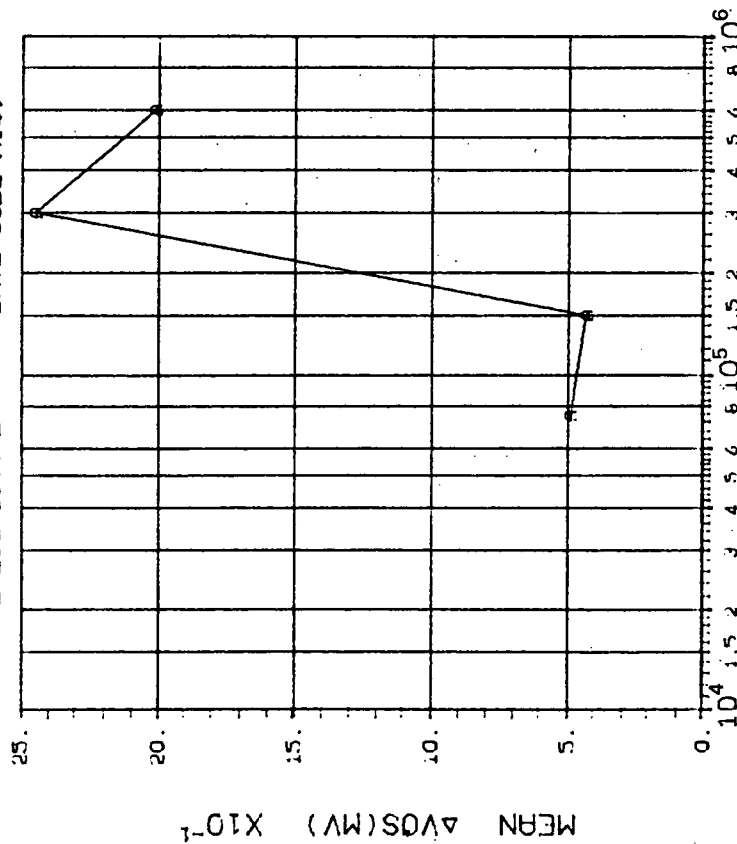
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 10 20 30 50 |
| | .0128 .0098 .0072 .0369 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0857-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

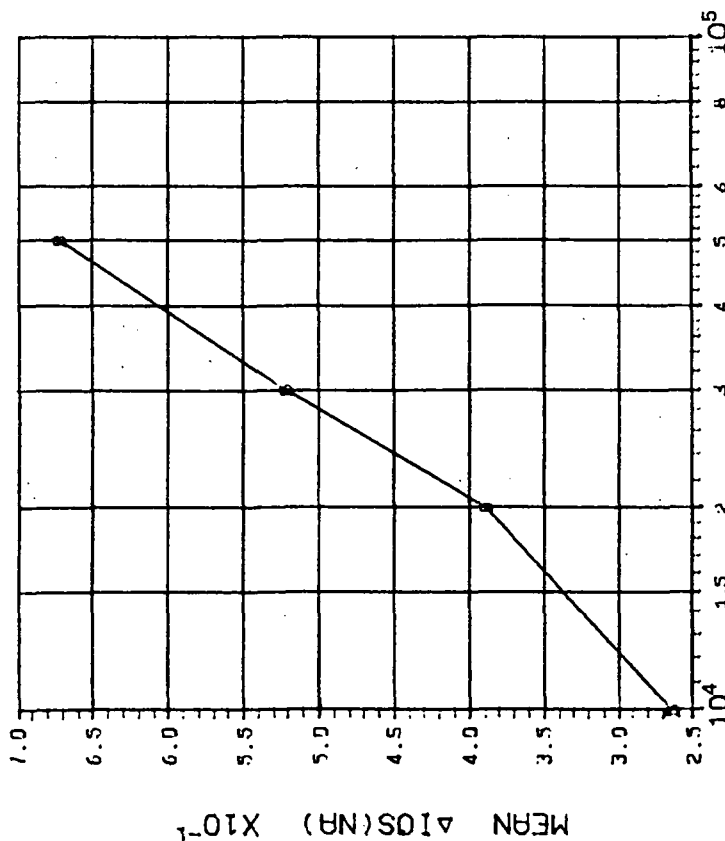
(1)ΔVOS(MV): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 75 150 300 600 |
| | .0439 .1328 .4117 1.482 |

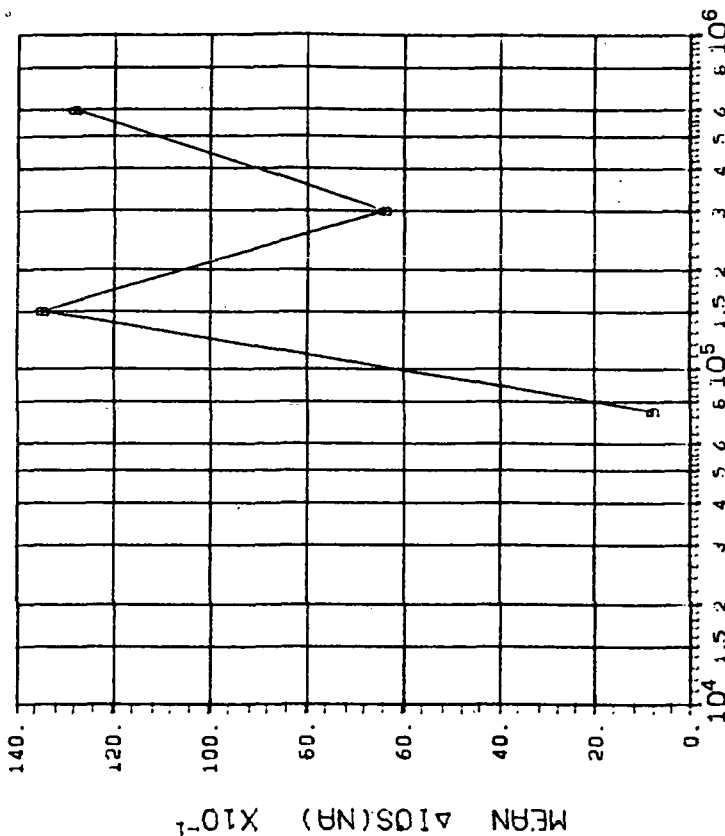
DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83
REF: JPL LOG 0857-1 DATE CODE H149



DEVICE TYPE: LM101 OP AMP

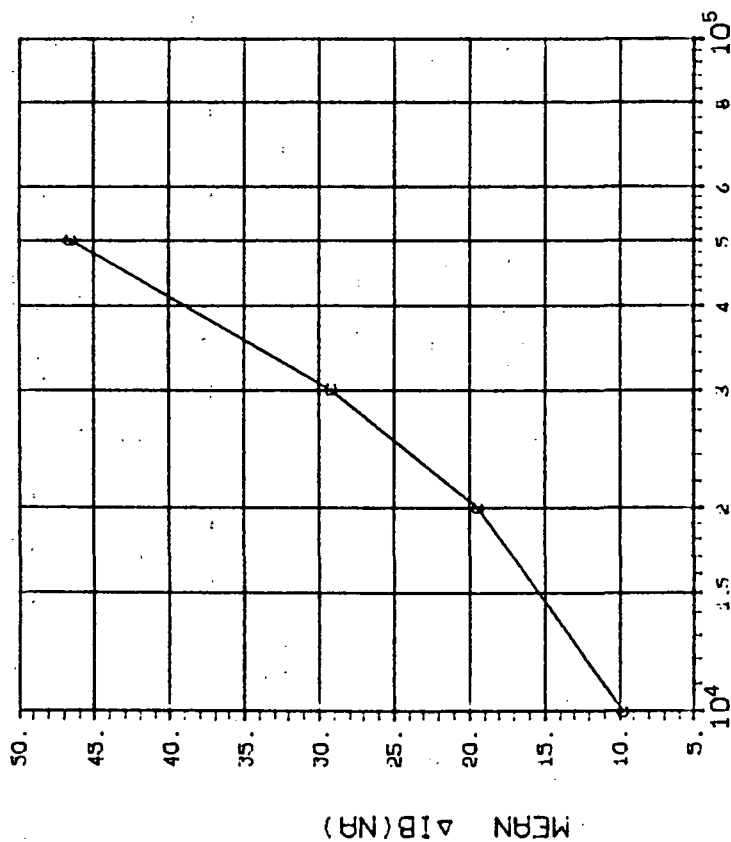
MFG: NSC 4 DEVICES TEST DATE 03-11-83
REF: JPL LOG 0857-2 DATE CODE H149



DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0857-1 DATE CODE H149



DOSE, rad(Si) 2.5 MeV electrons

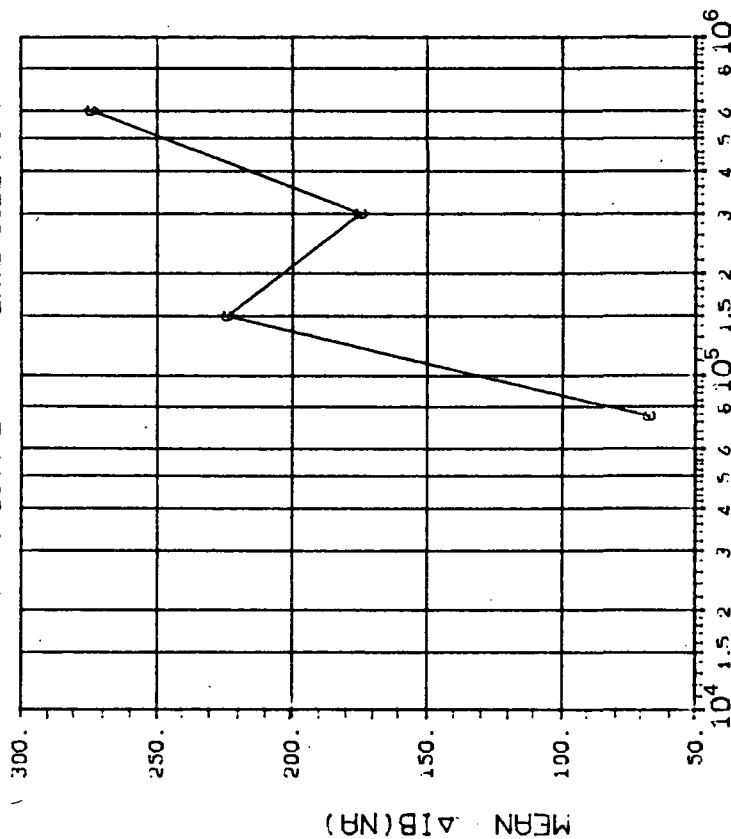
(3) ΔIB (NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 |
| | 30 | 50 |
| C | 2.067 | 2.695 |
| | 3.640 | 4.619 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0857-2 DATE CODE H149



DOSE, rad(Si) 2.5 MeV electrons

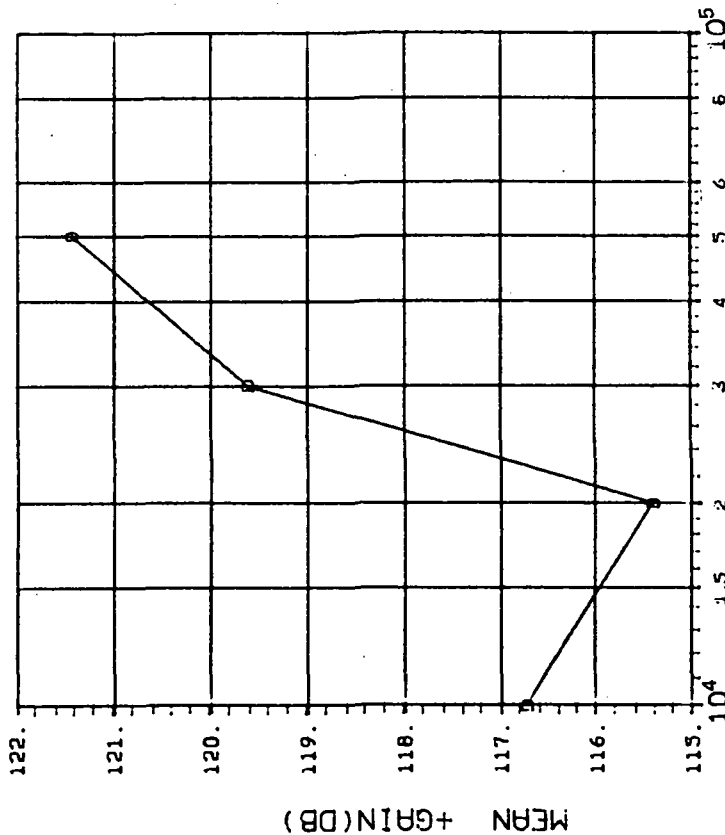
(3) ΔIB (NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 |
| | 300 | 600 |
| C | 5.056 | 28.26 |
| | 6.039 | 53.36 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0857-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(5.MA LOAD,+10V) : VS DOSE

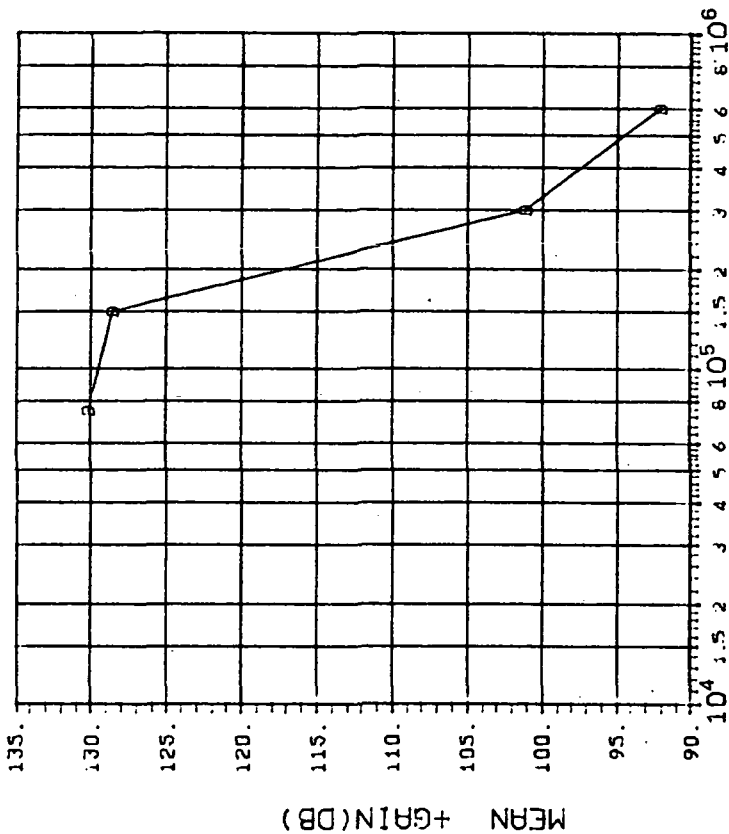
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 3.444 10 20 30 50 |
| | | 7467 7918 2.493 |

INITIAL MEAN VALUE +GAIN(DB) = 1.16X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0857-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(5.MA LOAD,+10V) : VS DOSE

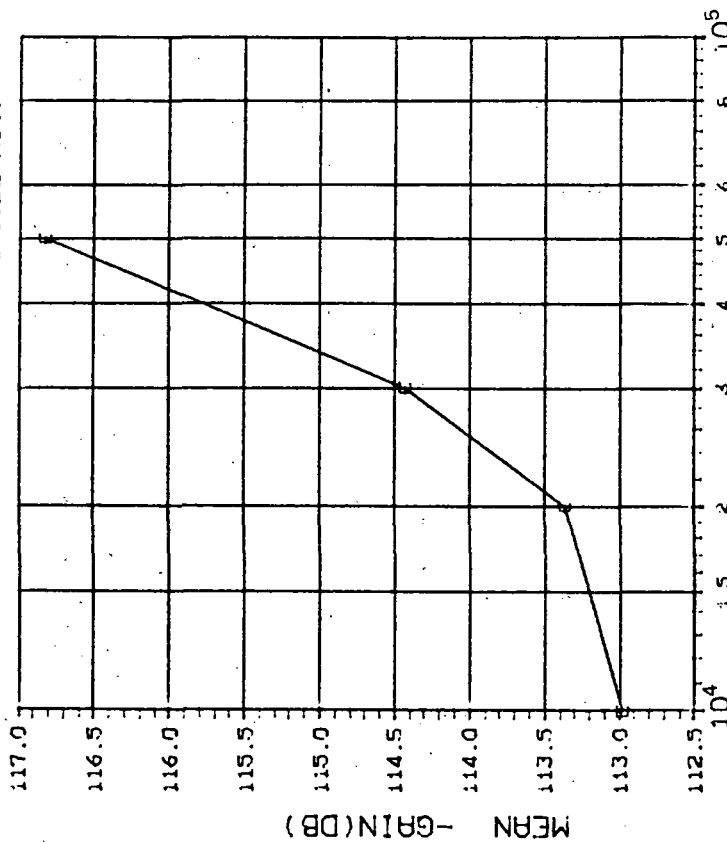
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 600 |
| | | 3.260 5.072 3.309 1.919 |

INITIAL MEAN VALUE +GAIN(DB) = 1.16X10⁺²

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DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83
REF: JPL LOG 0857-1 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

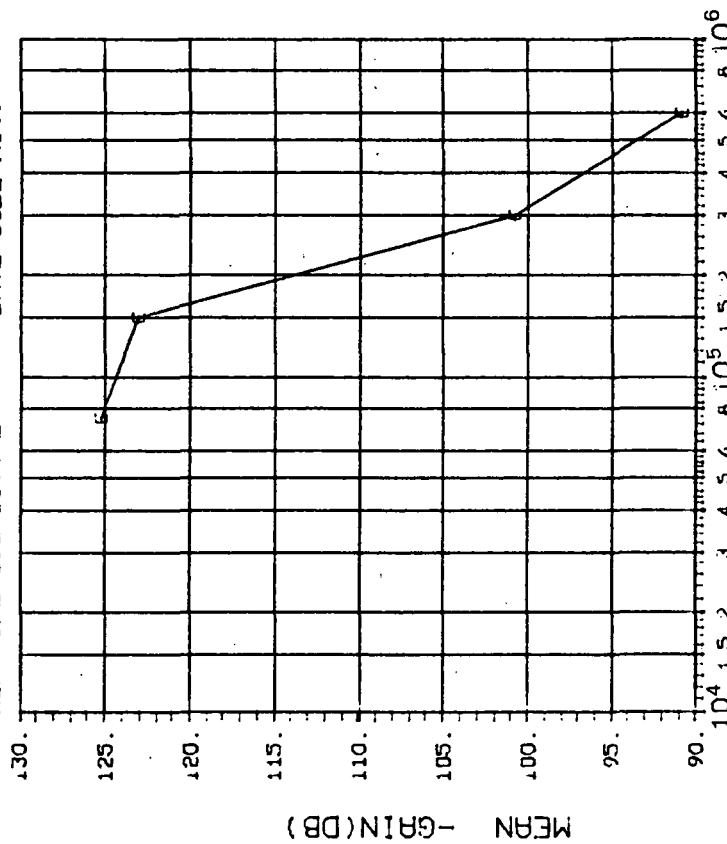
(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 10 |
| | | 20 |
| | | 30 |
| E | 5.00 | 50 |
| | | 10 |
| | | 20 |
| E | 5.00 | 5224 |
| | | 5284 |
| | | 2.217 |

INITIAL MEAN VALUE -GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-11-83
REF: JPL LOG 0857-2 DATE CODE H149



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(5.MA LOAD, -10V): VS DOSE

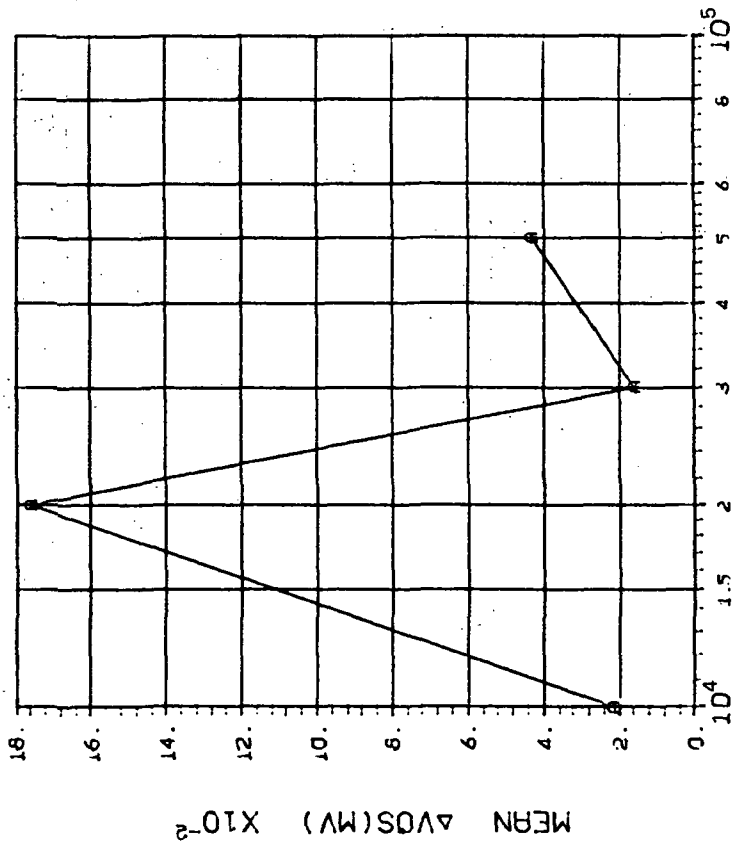
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 75 |
| | | 150 |
| | | 300 |
| E | 5.00 | 600 |
| | | 3.177 |
| | | 2.663 |
| E | 5.00 | 4.776 |
| | | 3.287 |
| | | 3.287 |

INITIAL MEAN VALUE -GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-1 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

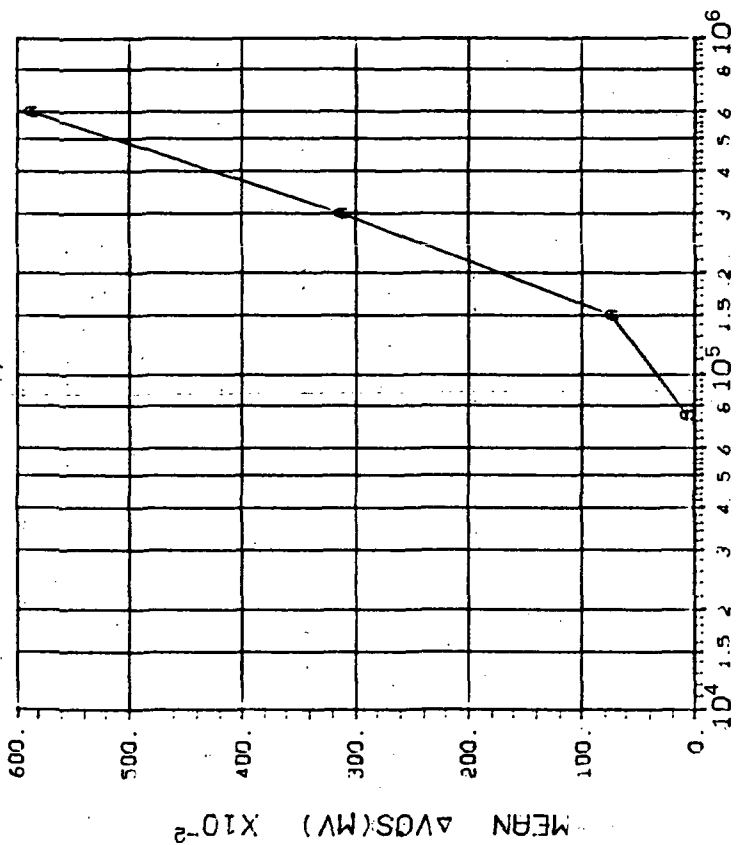
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------|
| CURVE | DOSE, kilorads(Si) ... | |
| | 10 | 20 30 50 |
| A | .0089 | .4067 .0106 .0244 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-2 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

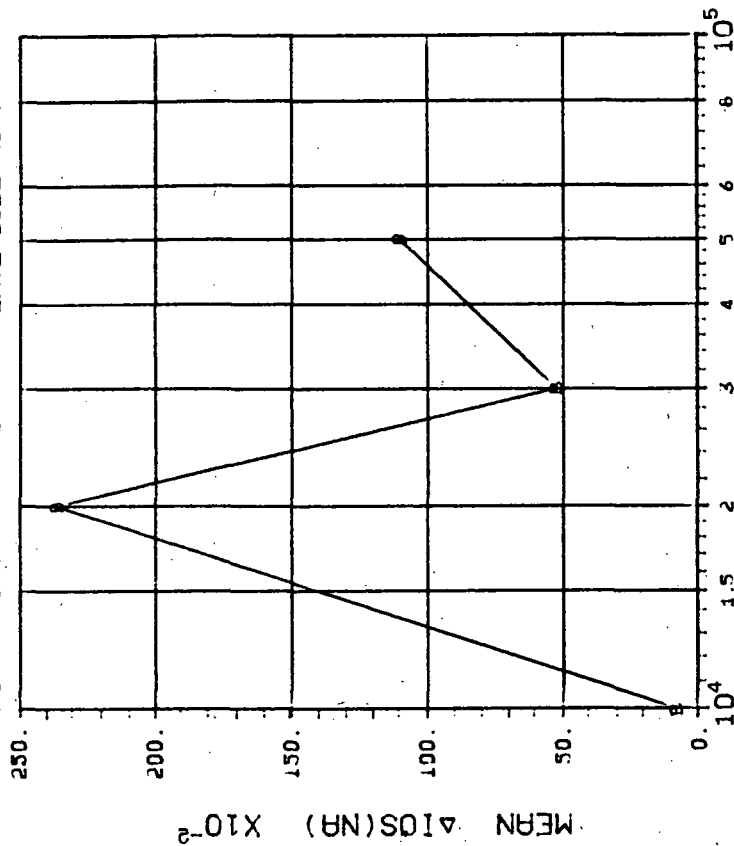
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------|
| CURVE | DOSE, kilorads(Si) ... | |
| | 75 | 150 300 600 |
| A | .0523 | .6187 1.995 3.364 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-1 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

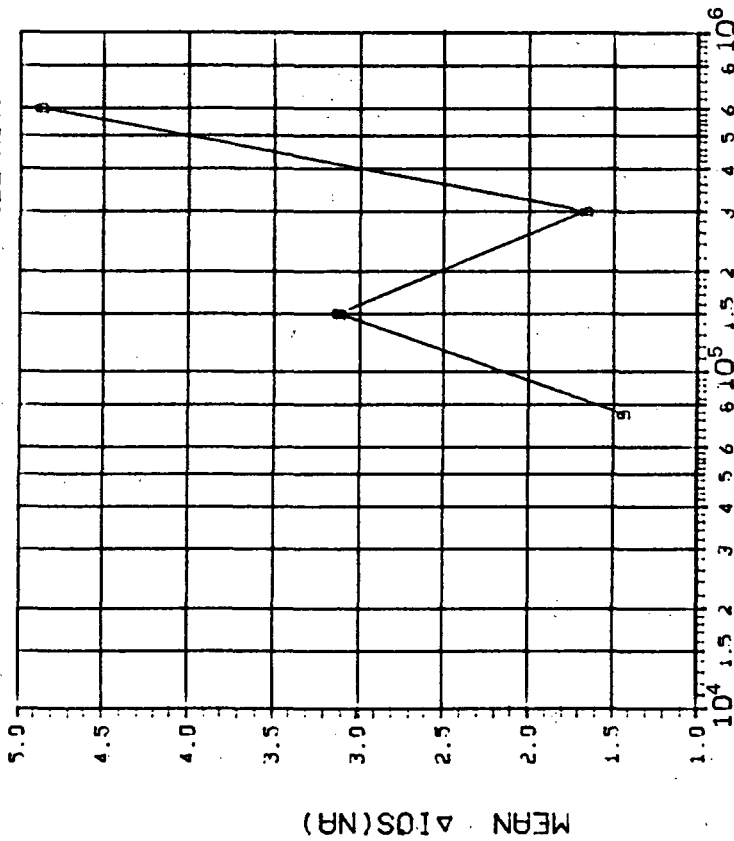
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| B | .1833 | 3.950 .6766 1.574 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-2 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

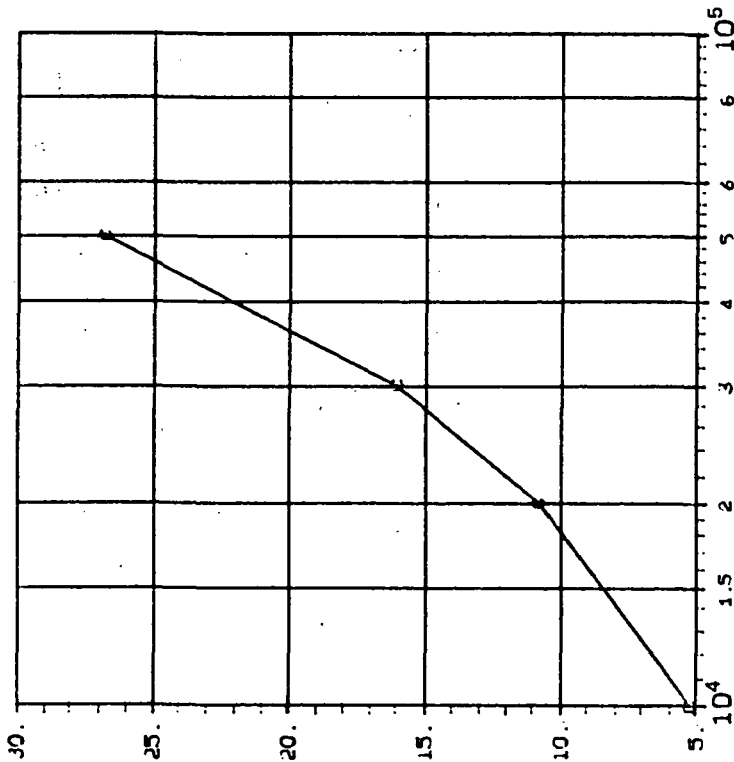
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| B | 2.162 | 3.288 6.612 12.91 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-1 DATE CODE H149



DOSE, rads(Si) Co⁶⁰ Gammas

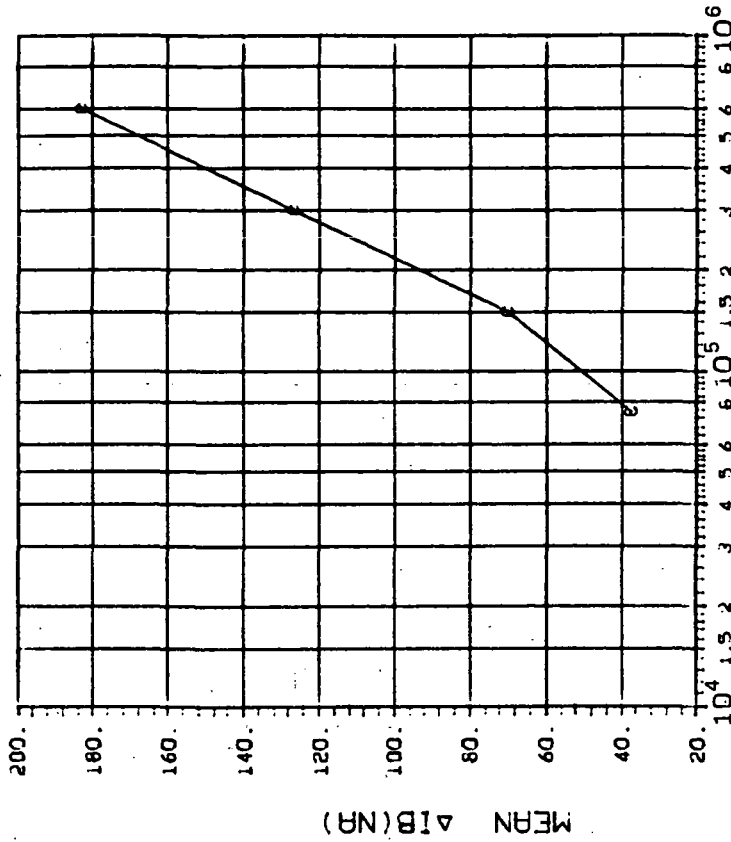
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | 2.000 | 4.067 6.267 11.48 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-2 DATE CODE H149



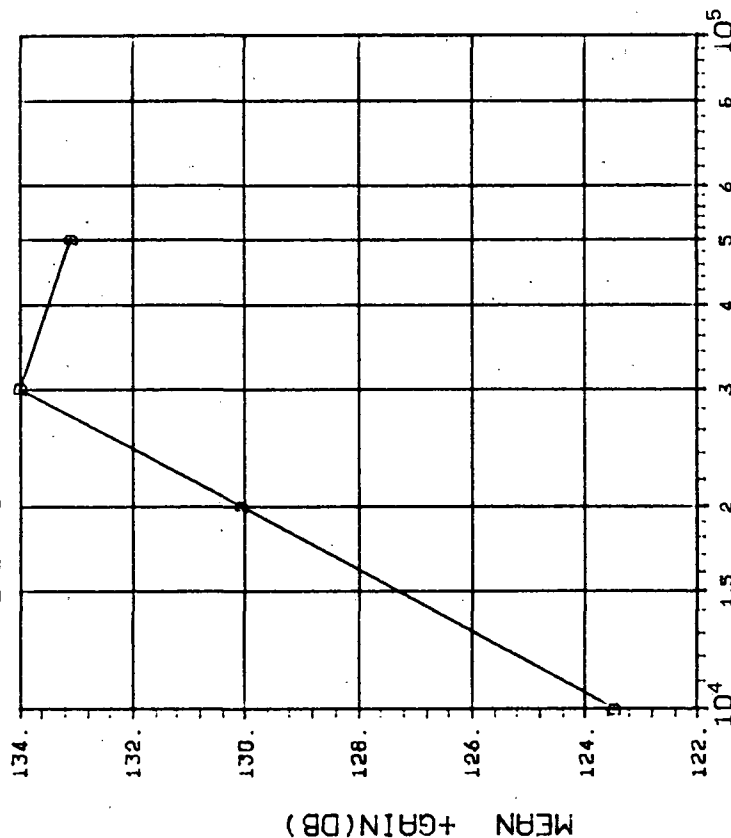
DOSE, rads(Si) Co⁶⁰ Gammas

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| C | 17.25 | 30.61 42.40 45.25 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83
REF: JPL LOG 0858-1 DATE CODE H149



DOSE, rads(Si) Co⁶⁰ Gammas

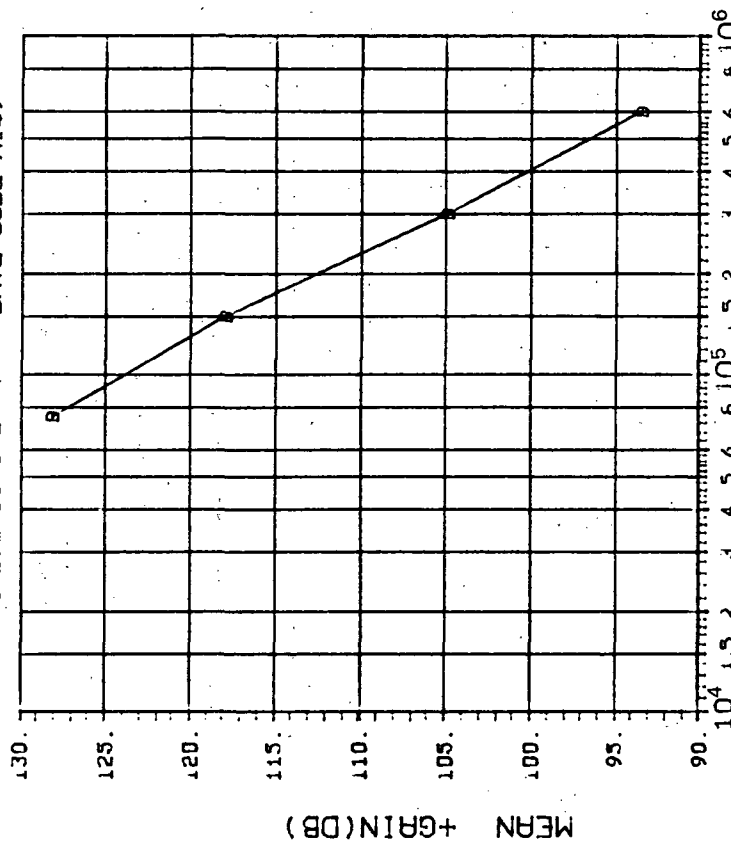
(4)+GAIN IN DB(5.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 10 20 30 50 |
| | | 4.112 2.849 4.916 1.761 |

INITIAL MEAN VALUE +GAIN(DB) = 1.18X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83
REF: JPL LOG 0858-2 DATE CODE H149



DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN IN DB(5.MA LOAD,+10V): VS DOSE

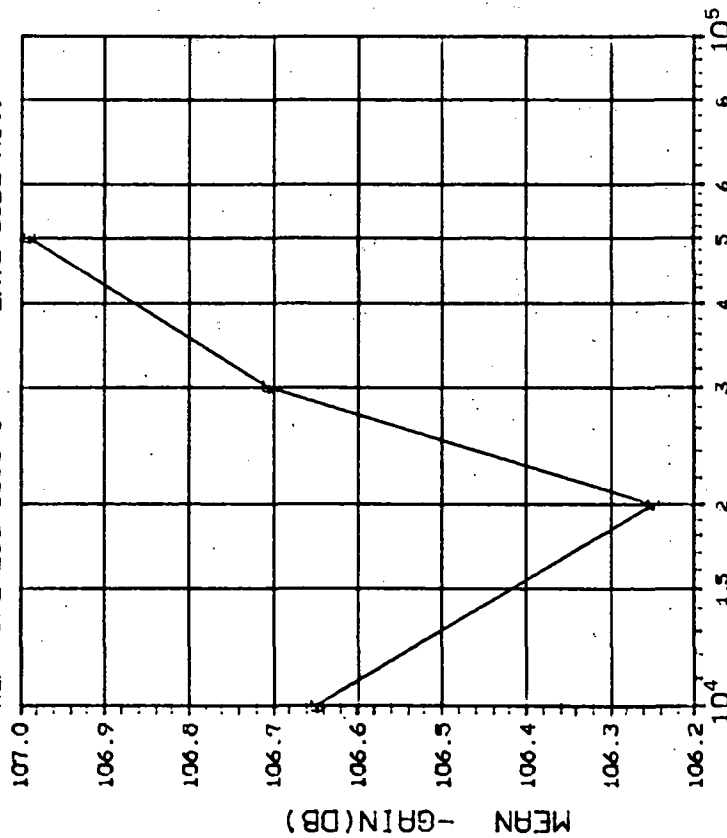
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 600 |
| | | 4.176 5.892 1.616 4.315 |

INITIAL MEAN VALUE +GAIN(DB) = 1.18X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-1 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(5.MA LOAD, -10V) : VS DOSE

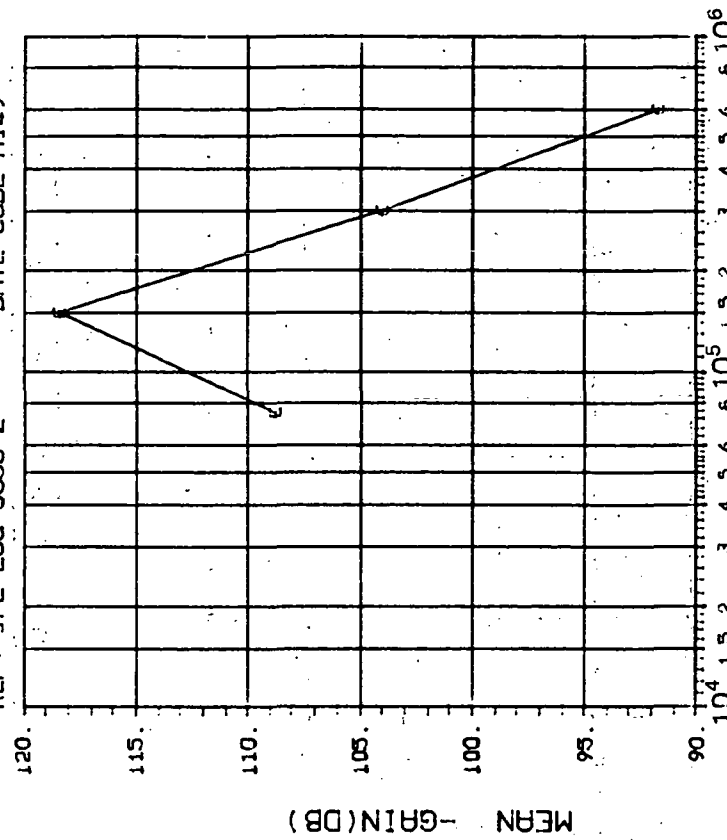
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | 10 20 30 50 |
| | | 1.022 .4576 .4576 1.119 |

INITIAL MEAN VALUE -GAIN(DB) = 1.06X10¹²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0858-2 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(5.MA LOAD, -10V) : VS DOSE

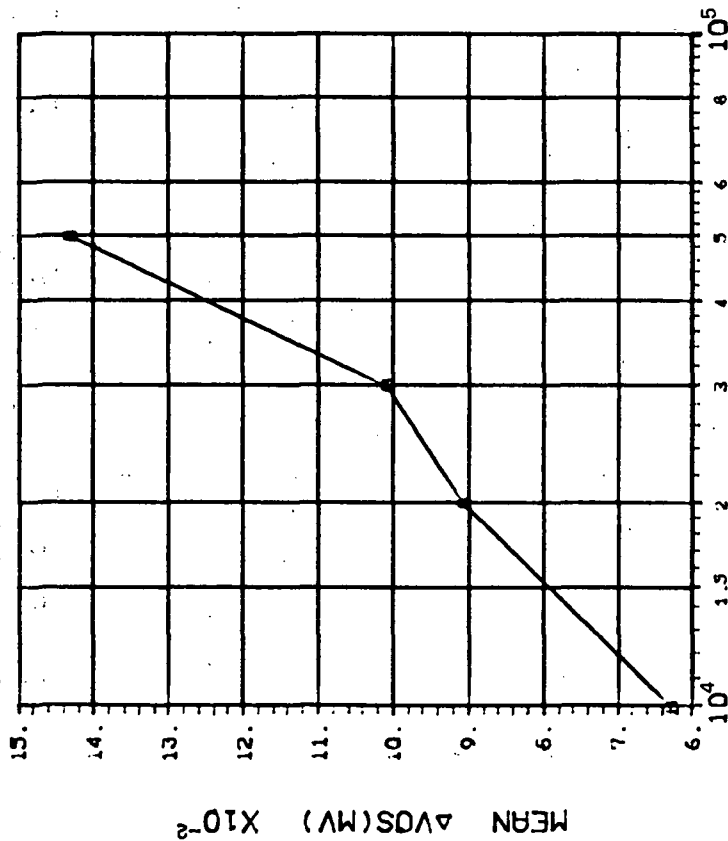
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 5.00 | .75 150 300 600 |
| | | .6311 6.688 2.666 5.573 |

INITIAL MEAN VALUE -GAIN(DB) = 1.06X10¹²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0839-1 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

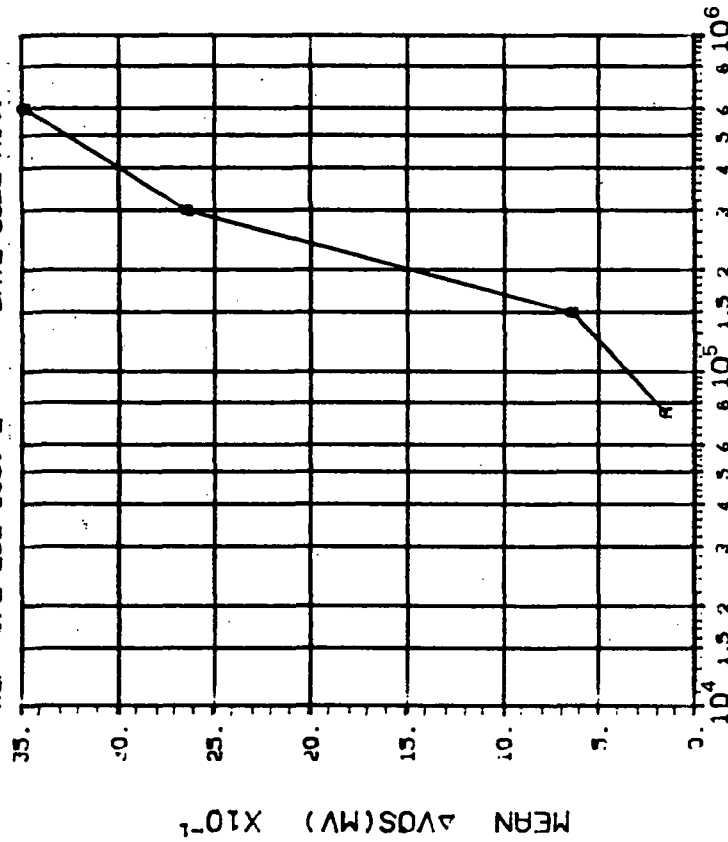
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 10 20 30 50 |
| | .0916 .1497 .1574 .2331 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0839-2 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

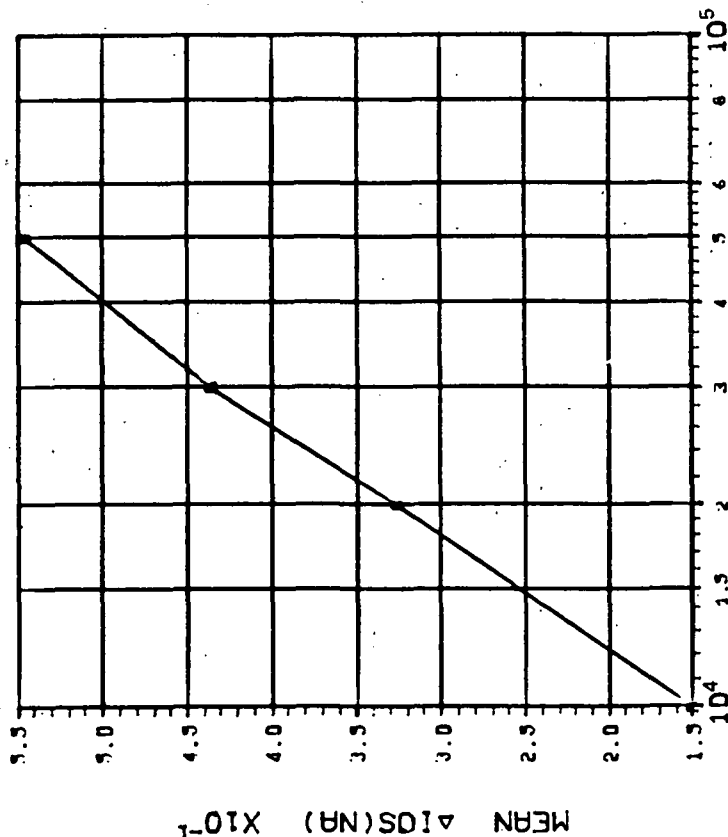
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 75 150 300 600 |
| | .2409 .4465 2.609 1.670 |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0839-1 DATE CODE H149

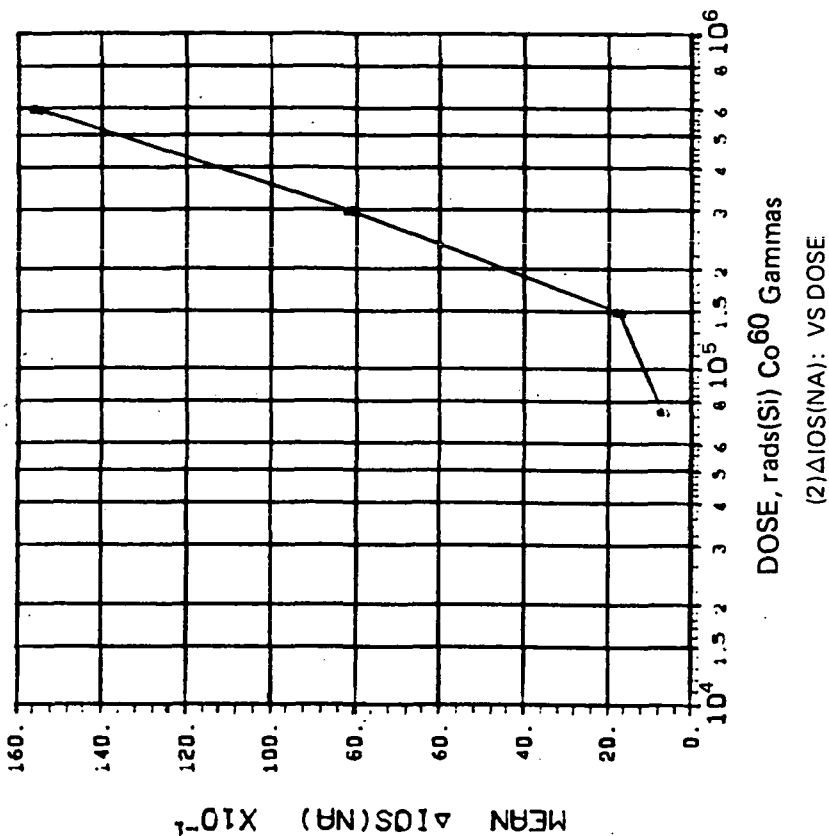


| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------|----------|
| CURVE | DOSE, kilorads(Si) | |
| B | 10 | 20 30 50 |
| | .1273 .2222 .3500 .3569 | |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0839-2 DATE CODE H149

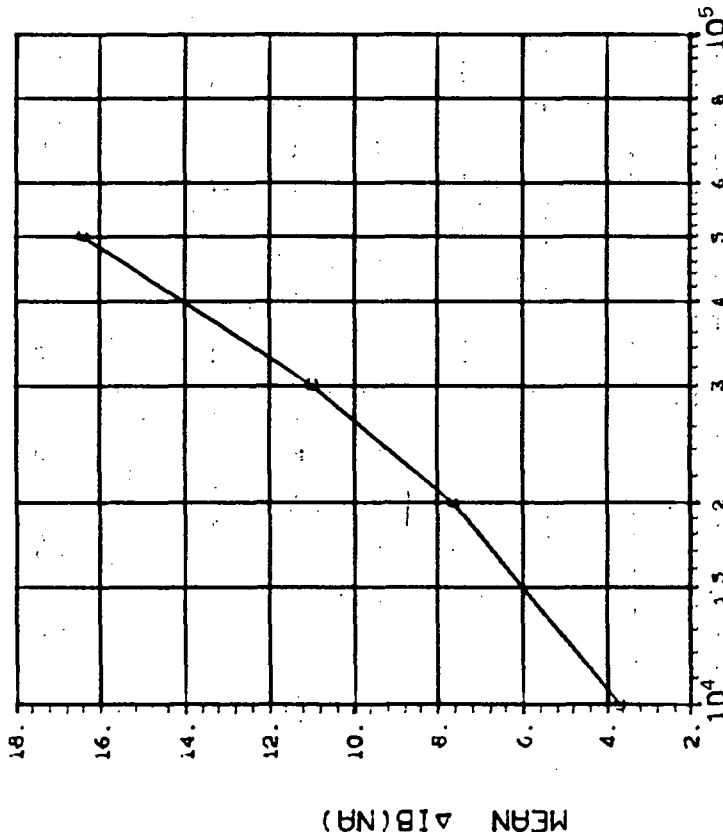


| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| B | 75 | 150 300 600 |
| | .7696 1.333 6.396 10.50 | |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0839-1 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

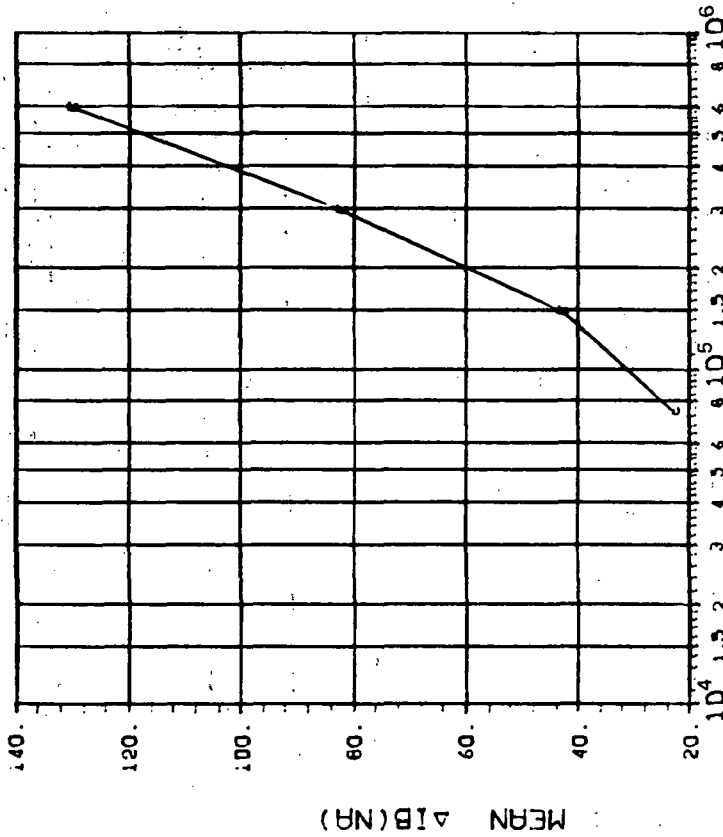
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| | 50 |
| 1.213 1.011 1.206 1.351 | |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0839-2 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

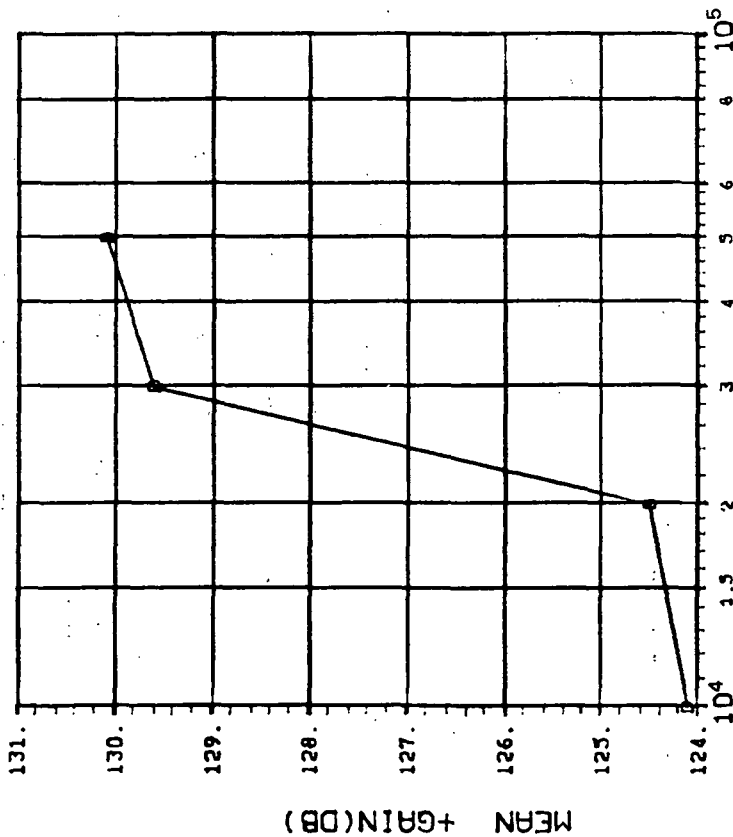
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| 1.340 1.683 4.685 8.277 | |

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0859-1 DATE CODE H149



DOSE, rads(Si) Co60 Gammas

(41)+GAIN IN DB (5.MA LOAD, +10V): VS DOSE

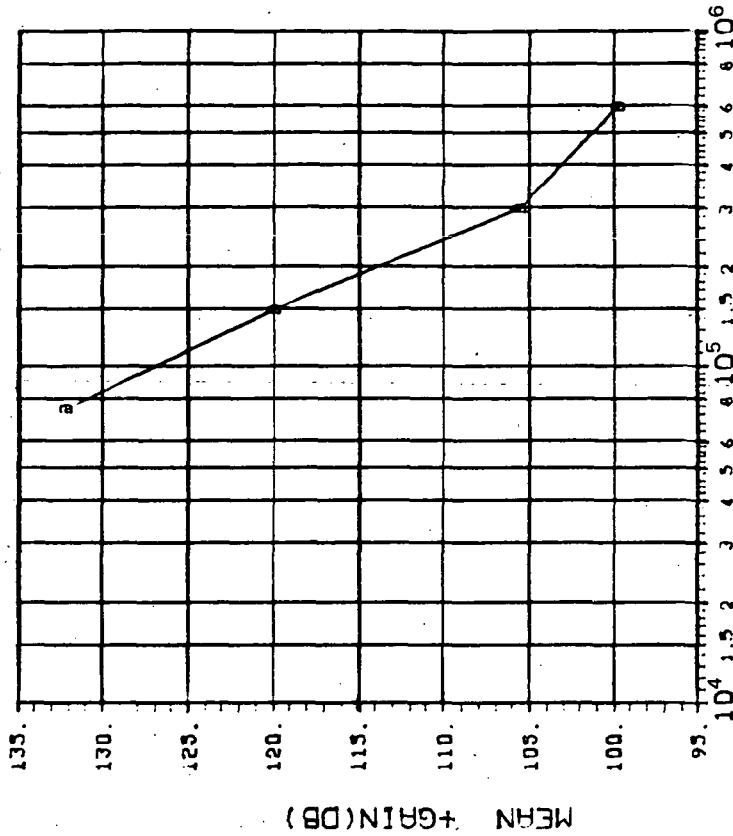
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 10 20 30 50 |
| | | 5.090 3.010 6.614 5.682 |

INITIAL MEAN VALUE +GAIN(DB) = 1.21X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0859-2 DATE CODE H149



DOSE, rads(Si) Co60 Gammas

(41)+GAIN IN DB (5.MA LOAD, +10V): VS DOSE

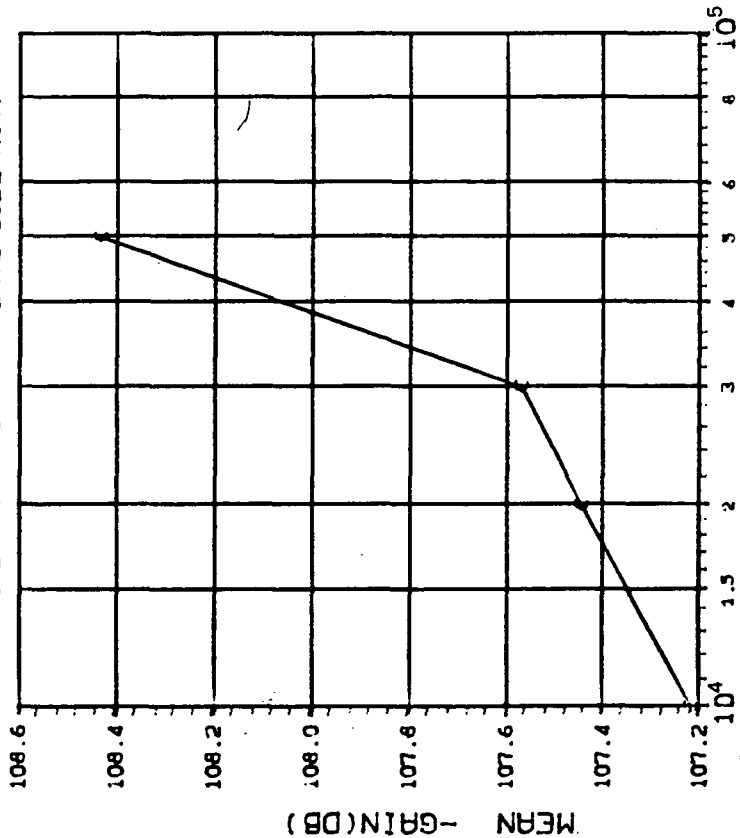
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 5.00 | 75 150 300 600 |
| | | 2.033 3.069 9.334 4.953 |

INITIAL MEAN VALUE +GAIN(DB) = 1.21X10⁺²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0859-1 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

(51-GAIN IN DB(5.MA LOAD, -10V) : VS DOSE

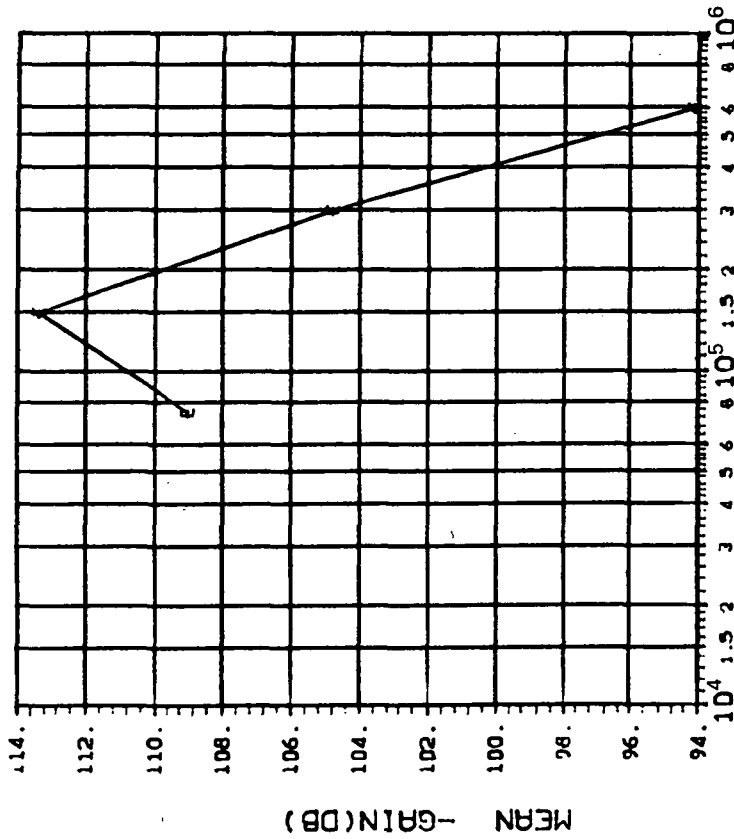
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| 1L | 5.00 | 10 20 30 50 |
| E | 5.00 | .9329 .9907 1.1789 .6106 |

INITIAL MEAN VALUE -GAIN(DB) = 1.06X10¹²

DEVICE TYPE: LM101 OP AMP

MFG: NSC 4 DEVICES TEST DATE 03-21-83

REF: JPL LOG 0859-2 DATE CODE H149



DOSE, rads(Si) Co 60 Gammas

(51-GAIN IN DB(5.MA LOAD, -10V) : VS DOSE

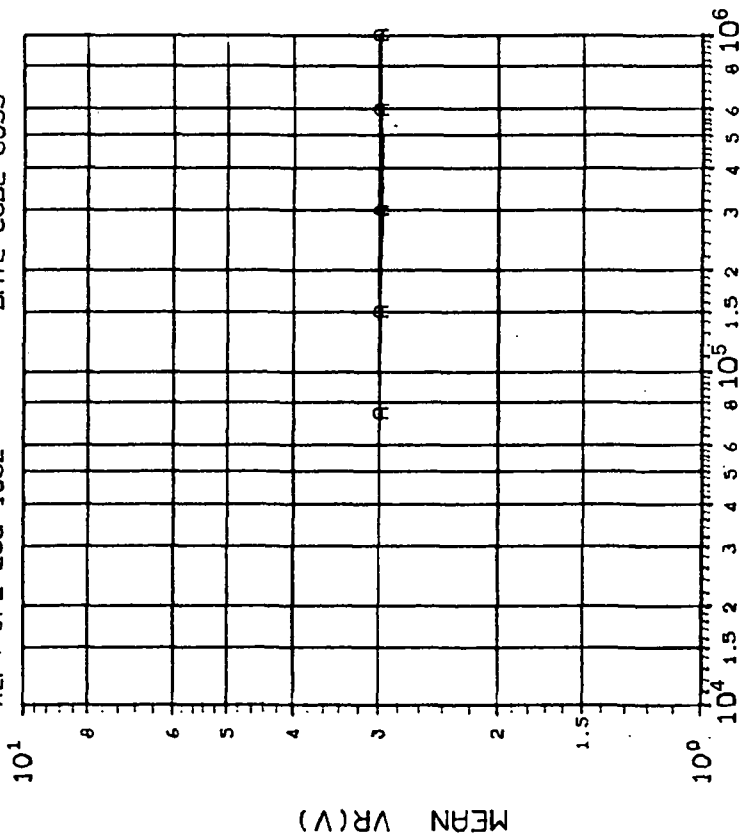
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| 1L | 5.00 | 75 150 300 600 |
| E | 5.00 | 1.250 3.580 14.39 9.666 |

INITIAL MEAN VALUE -GAIN(DB) = 1.06X10¹²

DEVICE TYPE: LM103-3.0 VOLTAGE REF

MFG: NSC 6 DEVICES TEST DATE 8-8-84

REF: JPL LOG 1082 DATE CODE 8033



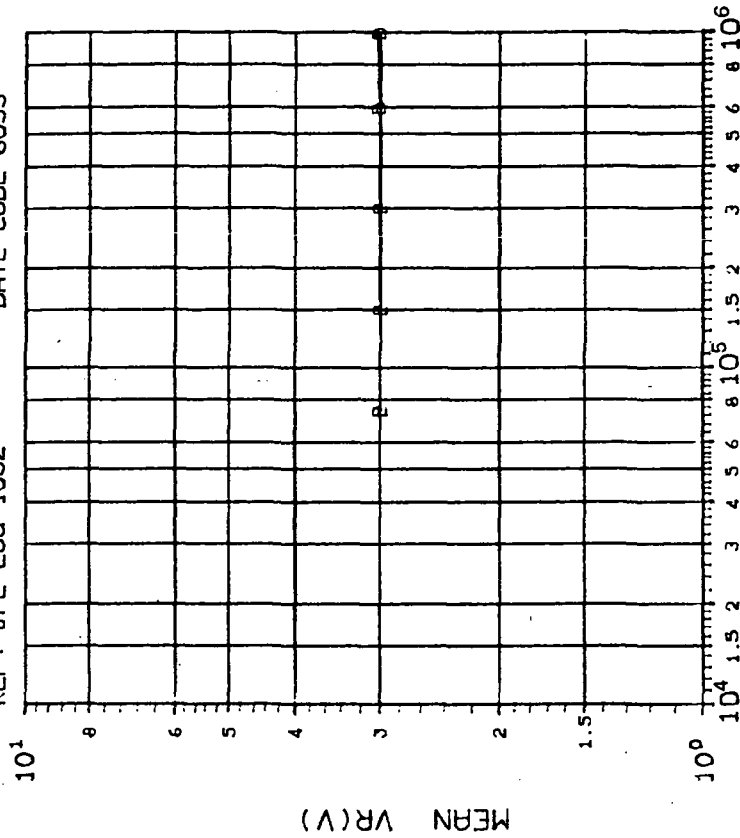
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| A | 75 | 150 |
| | 300 | 600 |
| | 1000 | |
| | .0359 | .0558 |
| | .0864 | .0550 |
| | | .0547 |

INITIAL MEAN VALUE VR(V) = 2.98X10⁺⁰

DEVICE TYPE: LM103-3.0 VOLTAGE REF

MFG: NSC 6 DEVICES TEST DATE 8-8-84

REF: JPL LOG 1082 DATE CODE 8033



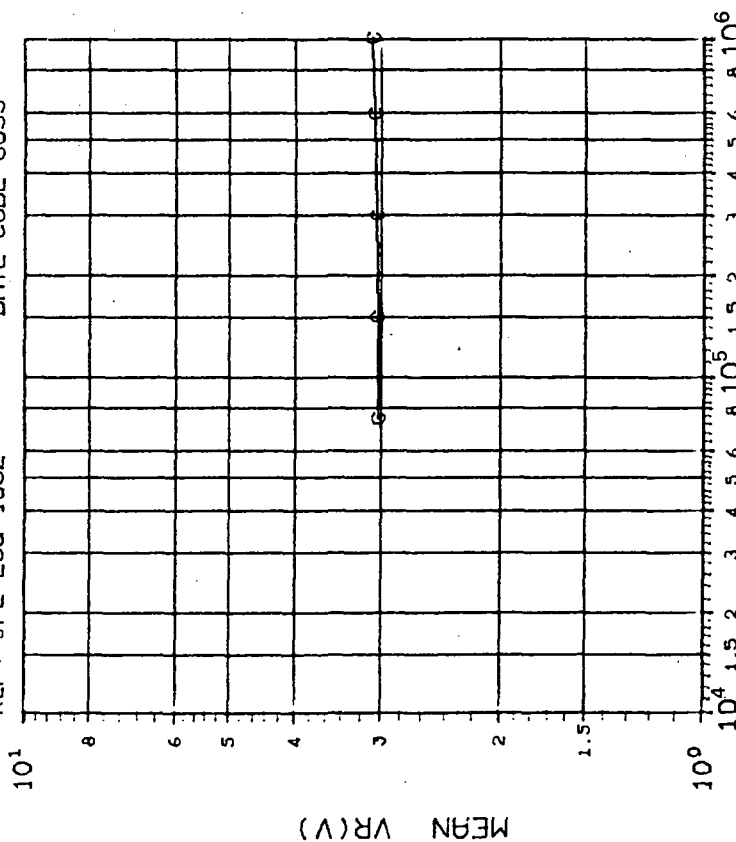
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| B | 75 | 150 |
| | 300 | 600 |
| | 1000 | |
| | .0558 | .0564 |
| | .0566 | .0563 |
| | | .0554 |

INITIAL MEAN VALUE VR(V) = 3.00X10⁺⁰

DEVICE TYPE: LM103-3.0 VOLTAGE REF

MFG: NSC 6 DEVICES TEST DATE 8-8-84

REF: JPL LOG 1082 DATE CODE 8033



DOSE, rads(Si) 2.5 MeV electrons

(3)VR (IR=1.0MA) IN V: VS DOSE

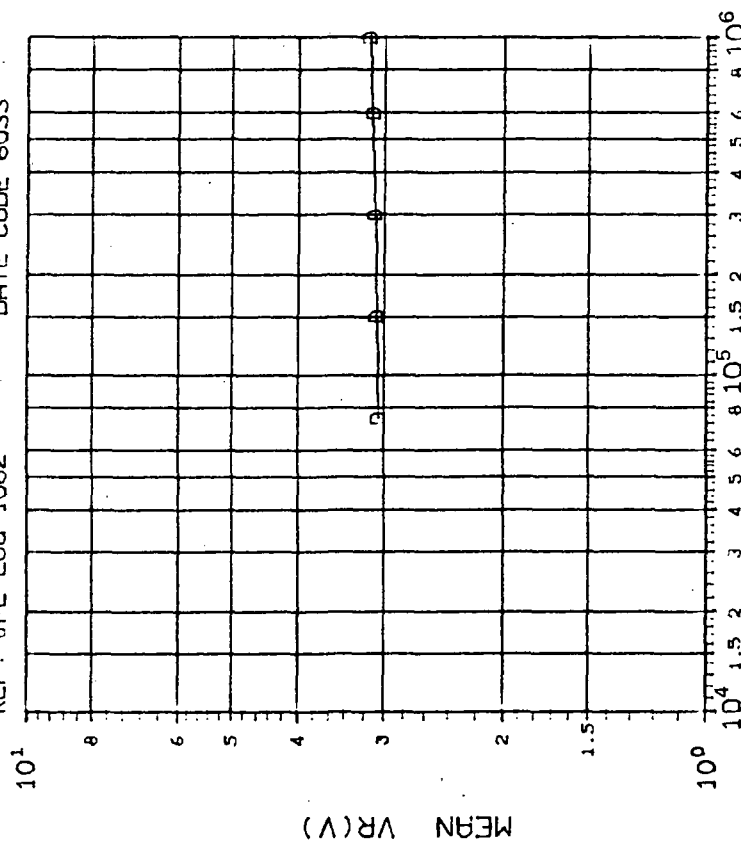
| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------------------|
| CURVE | DOSE, kilorads(Si) | | |
| | 75 | 150 | 300 600 1000 |
| C | .0566 | .0568 | .0572 .0566 .0555 |

INITIAL MEAN VALUE VR(V) = $3.01 \times 10^{+0}$

DEVICE TYPE: LM103-3.0 VOLTAGE REF

MFG: NSC 6 DEVICES TEST DATE 8-8-84

REF: JPL LOG 1082 DATE CODE 8033



DOSE, rads(Si) 2.5 MeV electrons

(4)VR (IR=14.0MA) IN V: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------------------|
| CURVE | DOSE, kilorads(Si) | | |
| | 75 | 150 | 300 600 1000 |
| D | .0612 | .0608 | .0598 .0592 .0583 |

INITIAL MEAN VALUE VR(V) = $3.03 \times 10^{+0}$

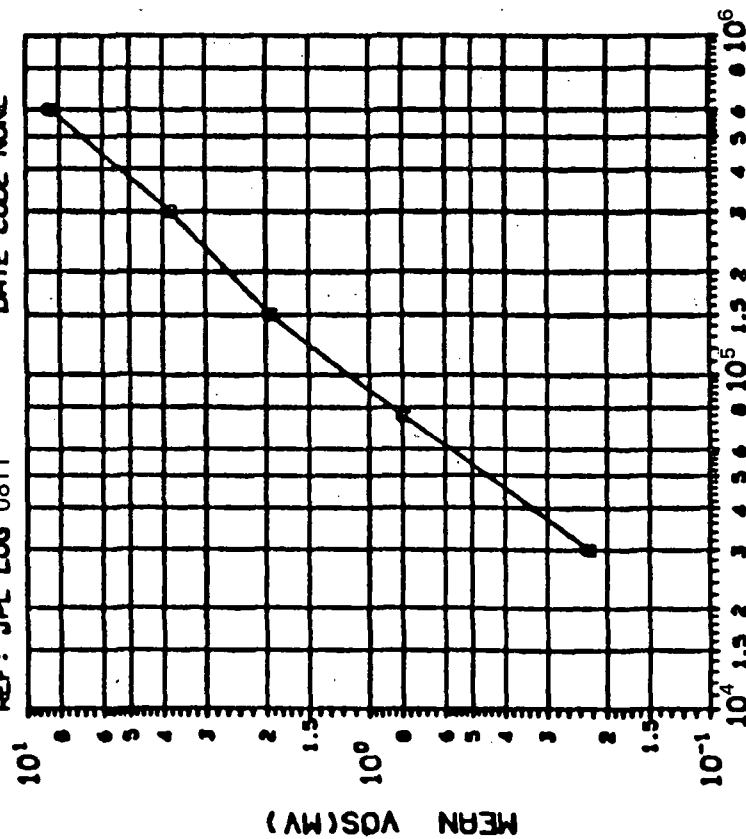
DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES

TEST DATE 5-12-82

DATE CODE NONE

REF: JPL LOG 0811



DOSE, rads(Si) 2.5 MeV electrons

(1) VDS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 30 75 150 300 600 |
| | .1925 .3471 .6101 1.642 3.767 |

INITIAL MEAN VALUE VDS(MV) = 1.41×10^{-1}

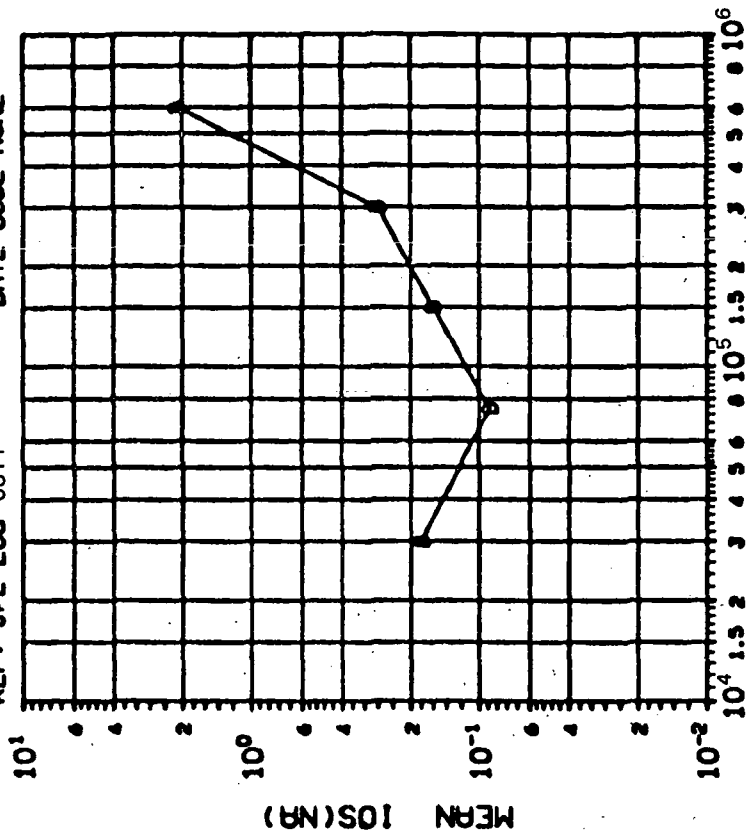
DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES

TEST DATE 5-12-82

DATE CODE NONE

REF: JPL LOG 0811



DOSE, rads(Si) 2.5 MeV electrons

(2) IOS(MA): VS DOSE

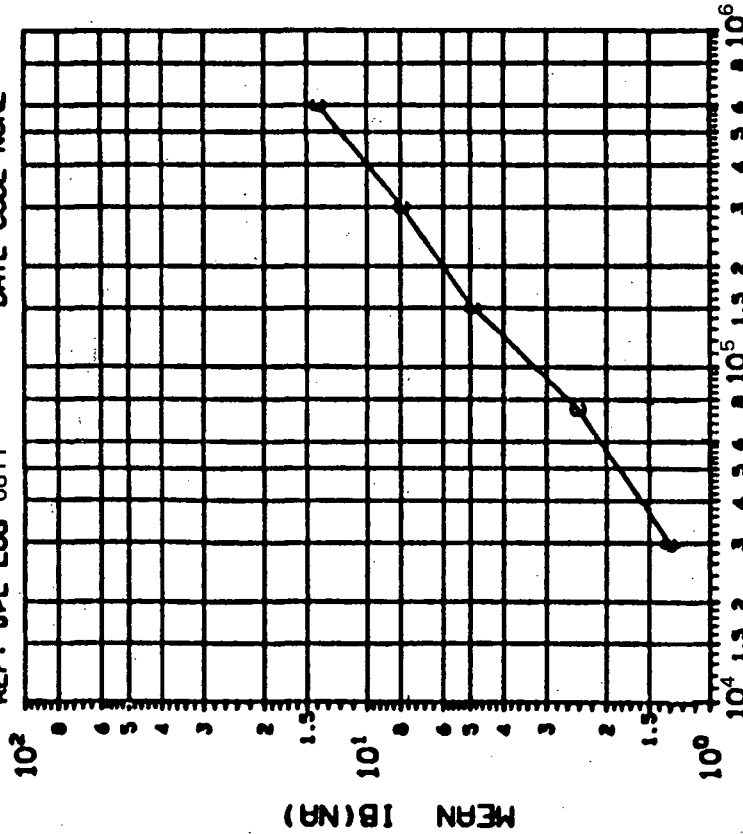
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 30 75 150 300 600 |
| | .0274 .0652 .4025 .9610 |

INITIAL MEAN VALUE IOS(MA) = 9.00×10^{-3}

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 5-12-82

REF: JPL LOG 0811 DATE CODE NONE



DOSE, rads(Si) 2.5 MeV electrons

(3) IB(NA): VS DOSE

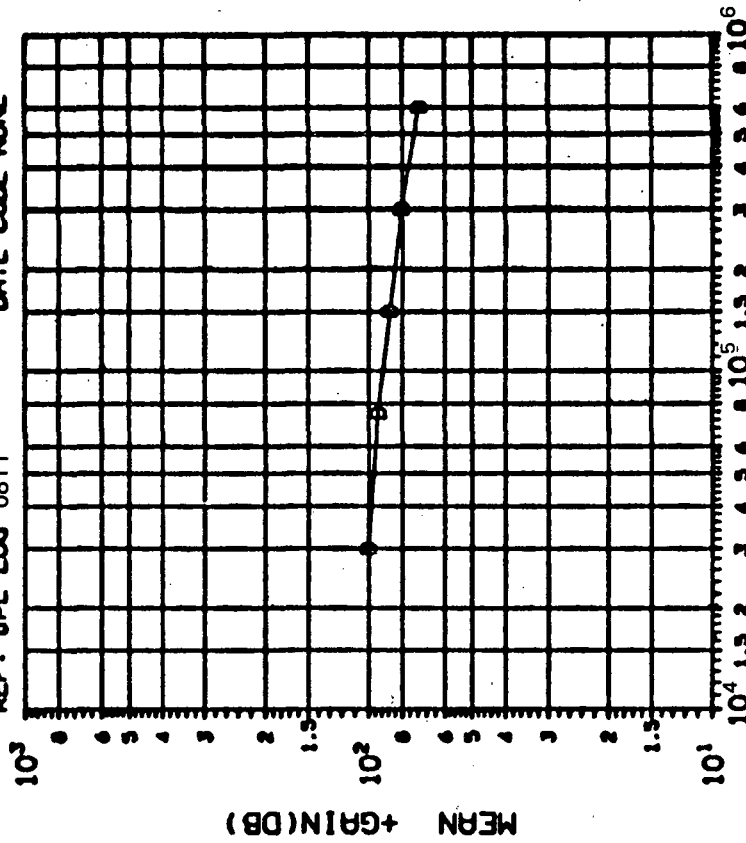
| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|---------------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 30 |
| | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 3.3521 0.6665 1.389 1.913 2.880 |

INITIAL MEAN VALUE IB(NA) = 0.67×10^{-1}

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 5-12-82

REF: JPL LOG 0811 DATE CODE NONE



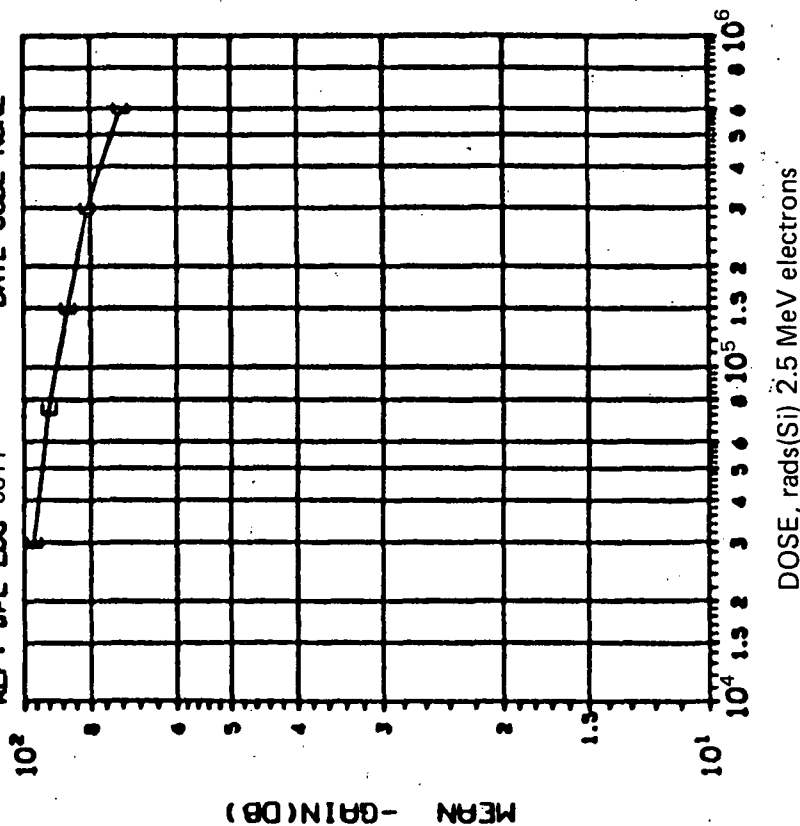
DOSE, rads(Si) 2.5 MeV electrons

(4) +GAIN(DB): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 30 |
| | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 3.156 3.551 3.761 3.728 4.466 |

INITIAL MEAN VALUE +GAIN(DB) = $1.07 \times 10^{+2}$

DEVICE TYPE: LM109 OP AMP
 MFG: RND 5 DEVICES TEST DATE 5-12-82
 REF: JPL LOG 0811 DATE CODE NONE



(5) -GAIN(DB): VS DOSE

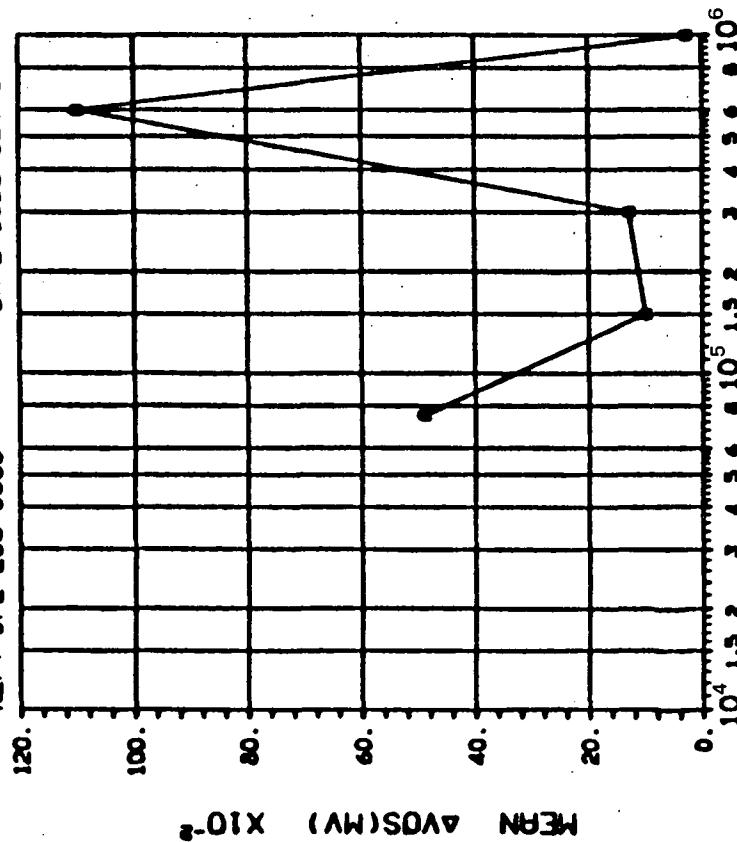
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 30 | 75 150 300 600 |
| E | 4.078 | 4.415 4.623 4.385 4.266 |

INITIAL MEAN VALUE -GAIN(DB) = $1.01 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 01-12-83

REF: JPL LOG 0836 DATE CODE 8238EM



DOSE, rads(Si) 2.5 MeV electrons

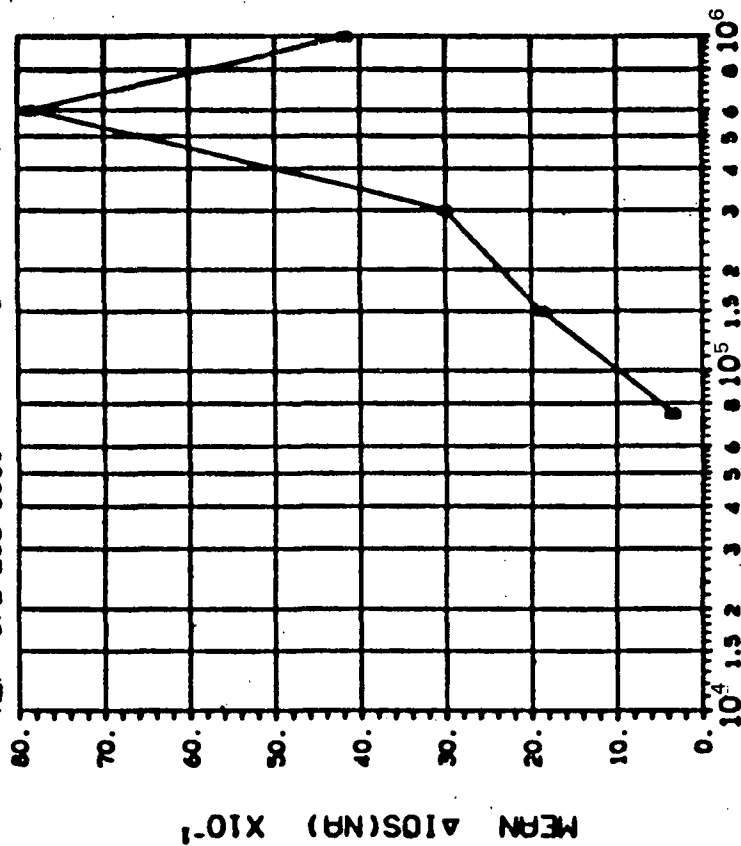
(1)ΔVOS(MV) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | 1.938 1.179 1.124 9.890 .8678 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 01-12-83

REF: JPL LOG 0836 DATE CODE 8238EM



DOSE, rads(Si) 2.5 MeV electrons

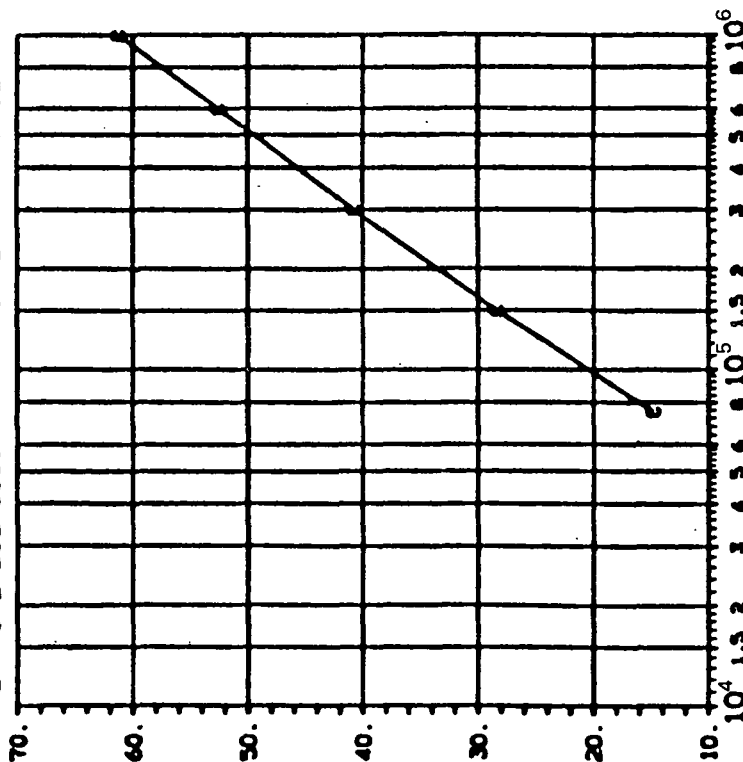
(2)ΔIOS(NR) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | 1.590 1.431 2.142 12.71 2.596 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD TEST DATE 01-12-83

REF: JPL LOG 0836 DATE CODE 8238EM



DOSE, rad(Si) 2.5 MeV electrons

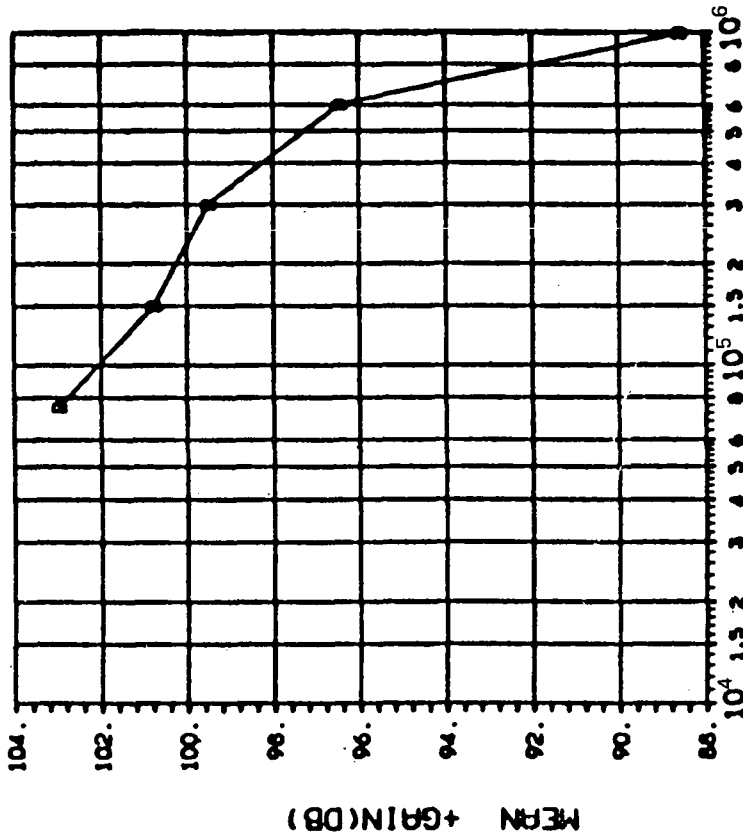
(3)ΔIB(NA) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| C | 1000 |
| | 6.206 |
| | 8.345 |
| | 10.78 |
| C | 12.98 |
| | 13.15 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD TEST DATE 01-12-83

REF: JPL LOG 0836 DATE CODE 8238EM



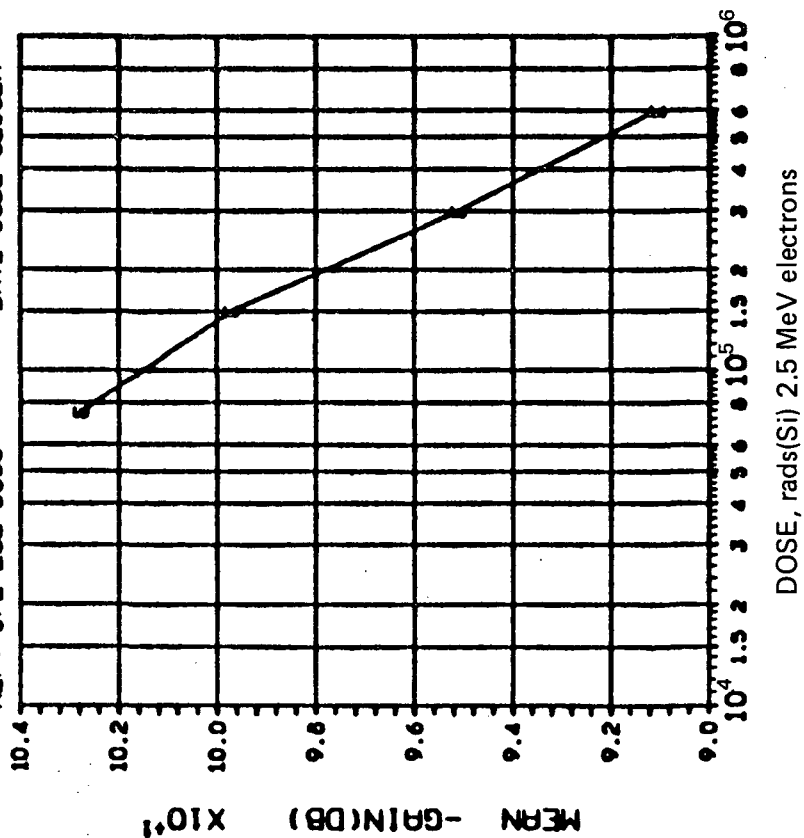
DOSE, rad(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD.+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| | 600 |
| D | 1000 |
| | 10.36 |
| | 6.573 |
| | 6.049 |
| D | 9.778 |
| | 4.660 |

INITIAL MEAN VALUE +GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LM108 OP AMP
 MFG: RND 5 DEVICES TEST DATE 01-12-83
 REF: JPL LOG 0836 DATE CODE 8238EM



(5)-GAIN IN DB(1.MA LOAD,-10V): VS DOSE

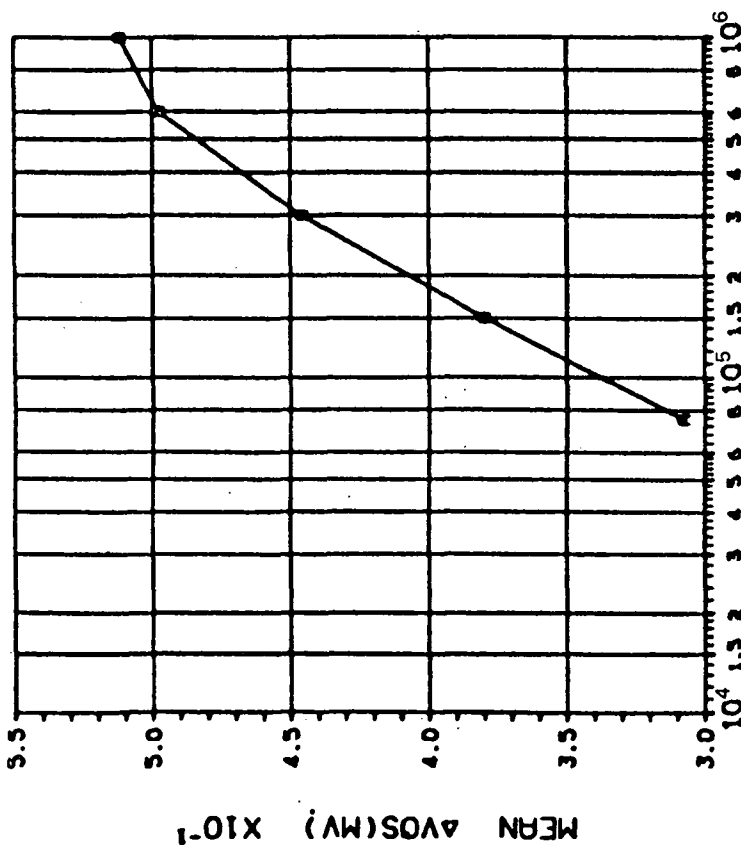
| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|-------------------------------|--|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| E | 1.00 | 75 150 300 600 1000 | |
| | | 10.57 7.997 6.096 5.220 ***** | |

INITIAL MEAN VALUE -GAIN(DB) = 1.15×10^{-2}

DEVICE TYPE: LM108 OP AMP

MFG: AMD TEST DATE 02-04-83

REF: JPL LOG 0837 DATE CODE 8238EM



DOSE, rads(Si) Co 60 Gammas

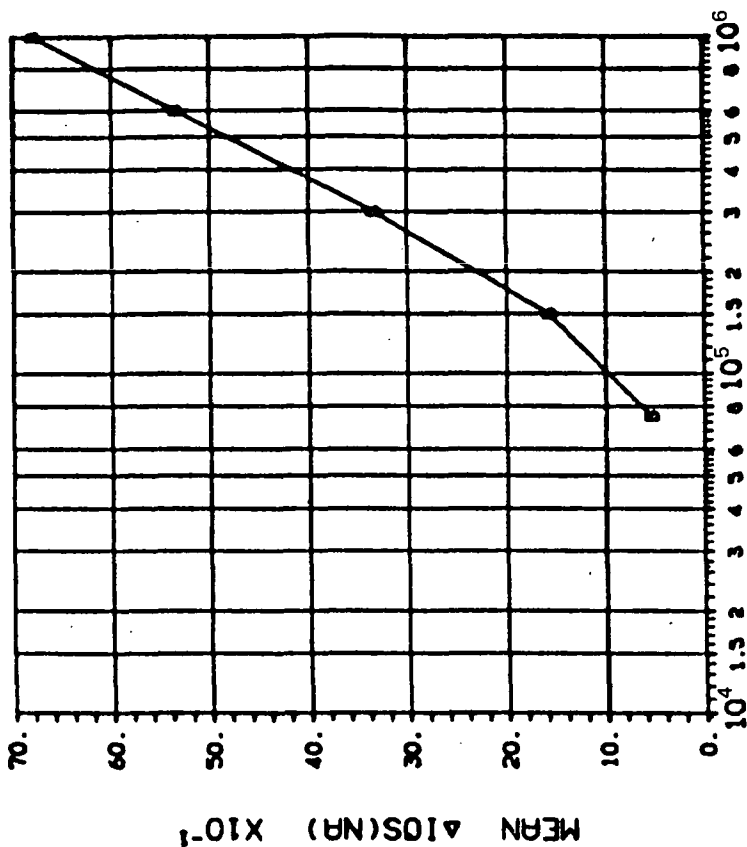
(1) Δ VOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | .5575 .8667 1.150 1.267 1.160 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 02-04-83

REF: JPL LOG 0837 DATE CODE 8238EM



DOSE, rads(Si) Co 60 Gammas

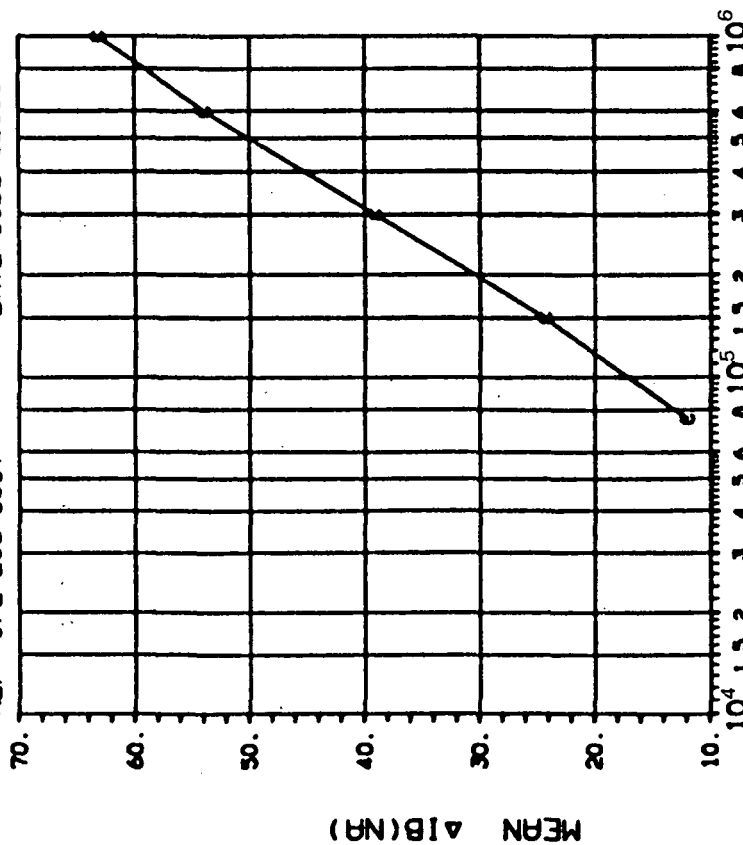
(2) Δ IOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | .3370 .8896 1.267 1.505 1.442 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 02-04-83

REF: JPL LOG 0637 DATE CODE 6238EM



DOSE, rads(Si) Co^{60} Gammas

(3) ΔIB (NA): VS DOSE

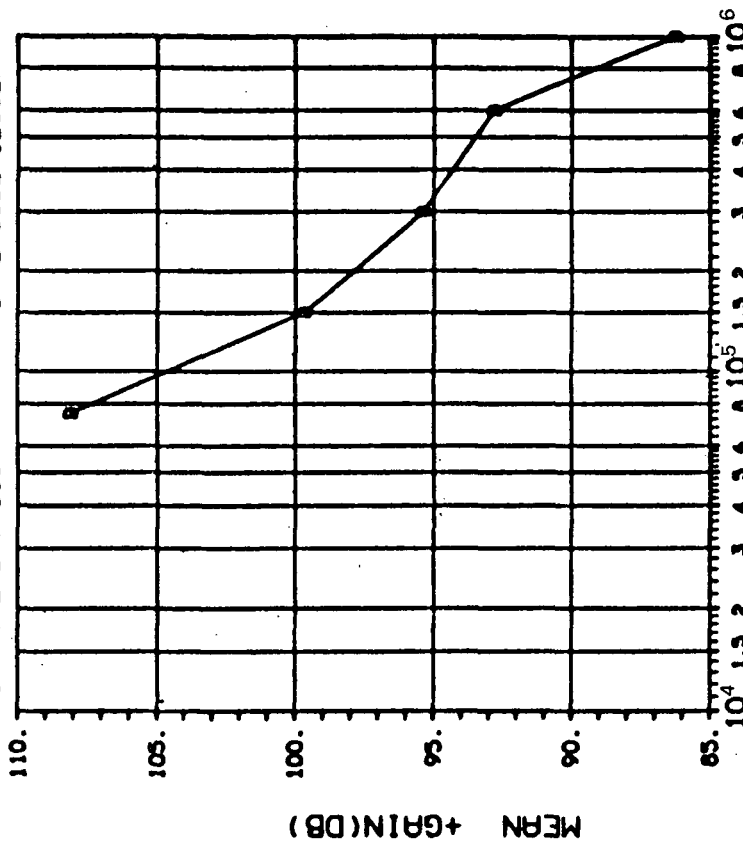
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------------|
| | 75 150 300 600 1000 |
| C | 1.890 4.063 6.278 8.938 8.525 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 02-04-83

REF: JPL LOG 0637 DATE CODE 6238EM



DOSE, rads(Si) Co^{60} Gammas

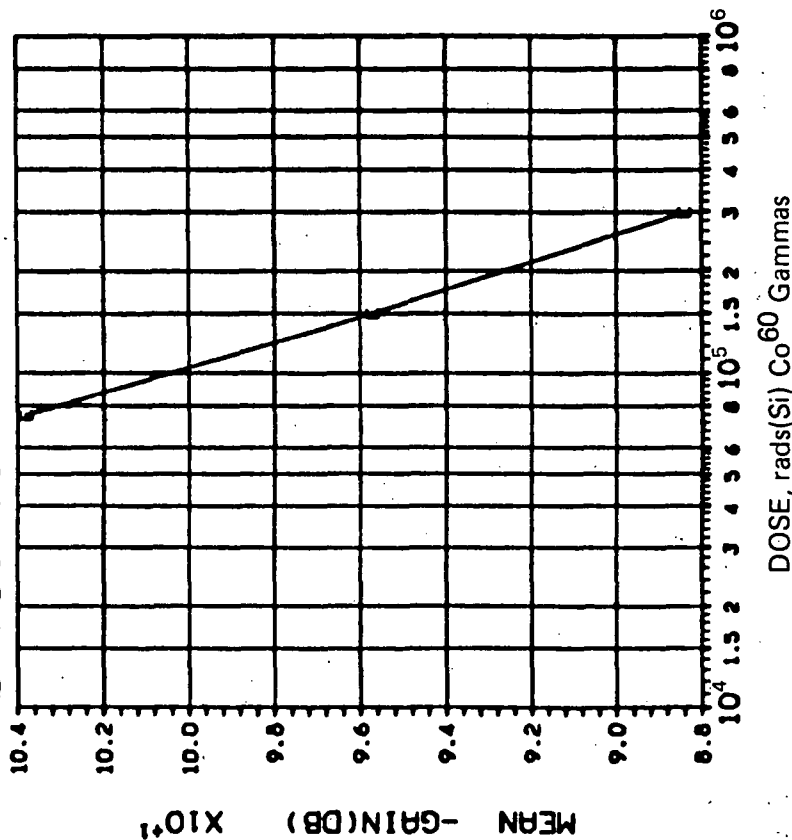
(4)+GAIN IN DB(1.0MA LOAD, +10V): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | I_L (mA) | DOSE, kilorads(Si) |
|-------|---------------------|-------------------------------|
| | 75 150 300 600 1000 | |
| D | 1.00 | 5.899 5.768 3.878 12.67 6.858 |

INITIAL MEAN VALUE +GAIN(DB) = $1.18 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP
 MFG: AMD 5 DEVICES TEST DATE 02-04-83
 REF: JPL LOG 0837 DATE CODE 8238EM



(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

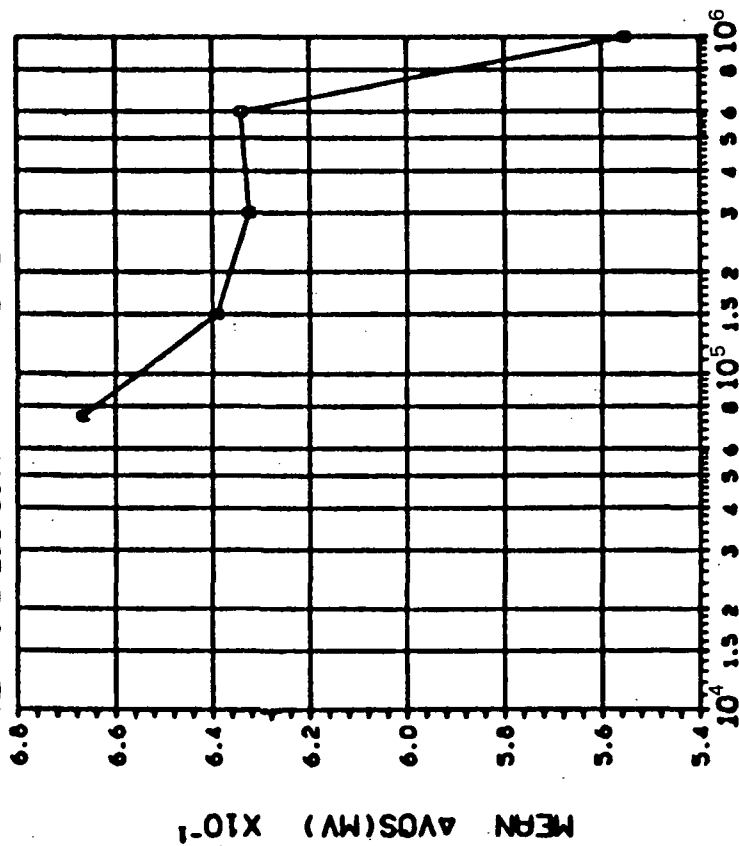
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|-------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 1000 |
| | | 3.094 2.843 3.852 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 1.15×10^{-1}

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0838 DATE CODE 8238EN



DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

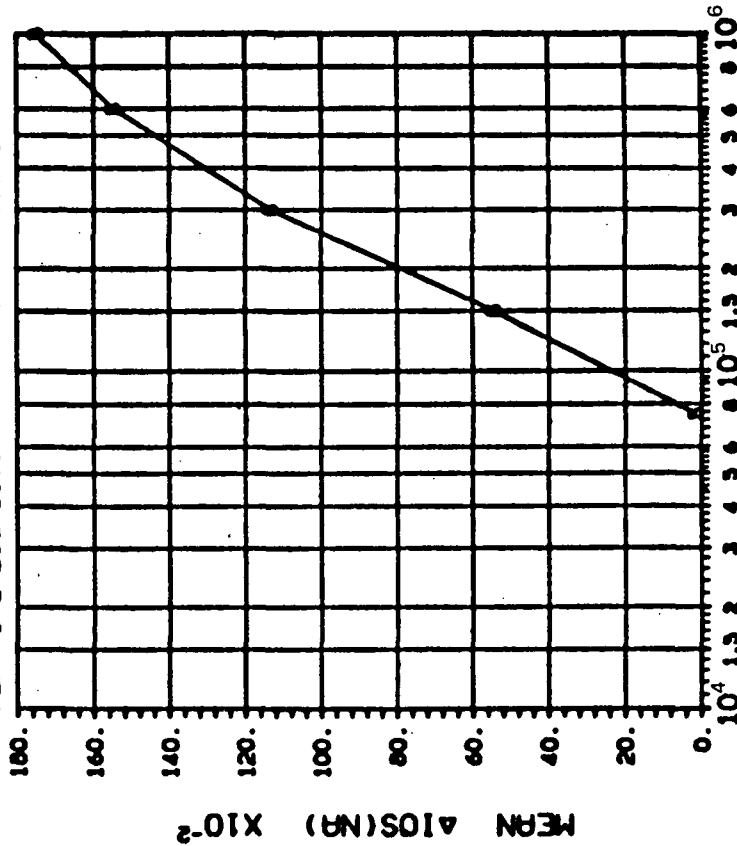
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------|
| | 75 | 150 | 300 | 1000 |
| A | 1.444 | 1.481 | 1.465 | 1.405 |
| | 1.405 | 1.076 | | |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0838 DATE CODE 8238EN



DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(MV): VS DOSE

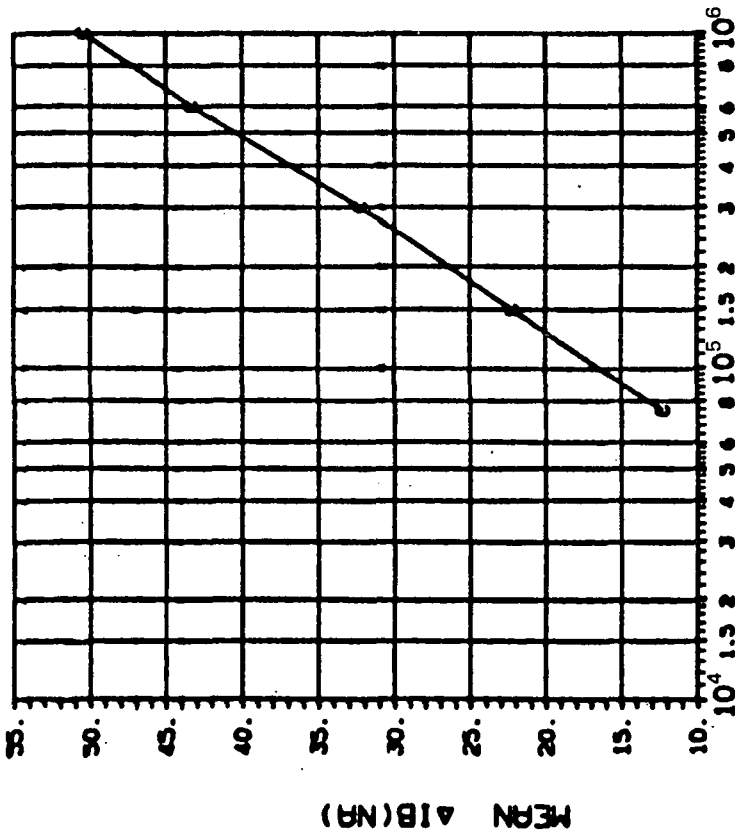
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------|
| | 75 | 150 | 300 | 1000 |
| B | .6519 | 1.111 | 1.645 | 2.002 |
| | 1.998 | | | |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0838 DATE CODE 8238EN



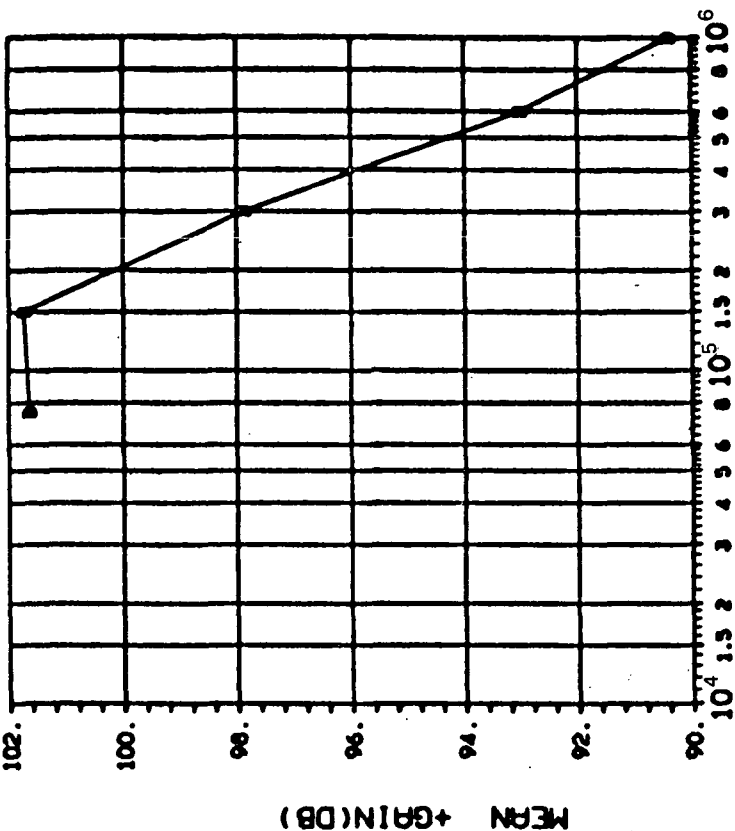
(3) ΔIB (NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | 2.530 4.333 5.892 7.128 8.324 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0838 DATE CODE 8238EN

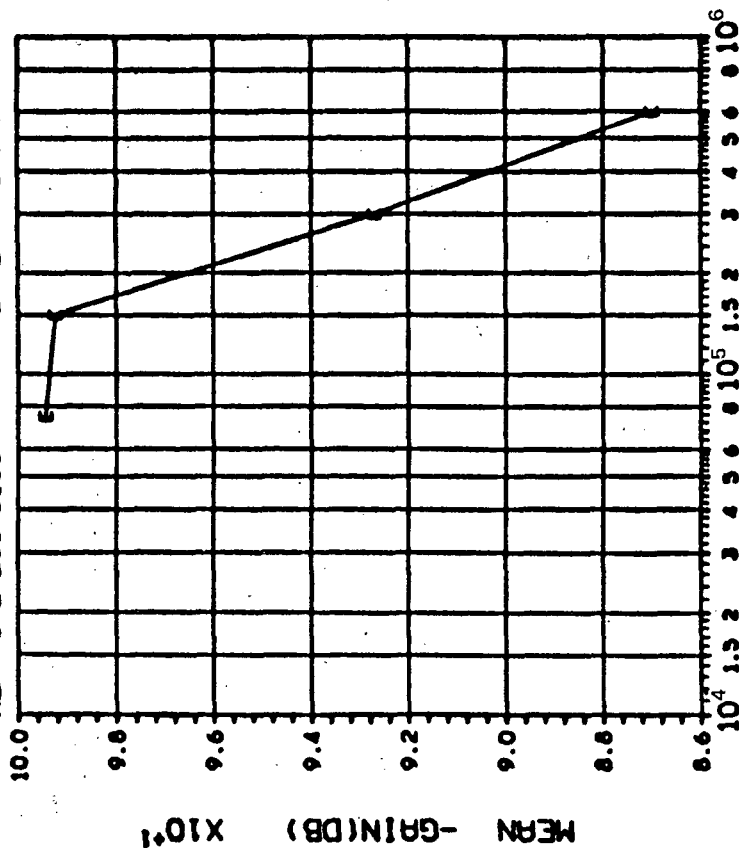


(4)+GAIN IN DB(1.MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|------------------------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | 1.00 4.940 10.41 4.757 1.747 2.236 |

INITIAL MEAN VALUE +GAIN(DB) = $1.12 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP
 MFG: AMD 5 DEVICES TEST DATE 01-13-83
 REF: JPL LOG 0636 DATE CODE 8238EM



DOSE, rad(Si) 2.5 MeV electrons

(S)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| | | 75 | 150 | 300 |
| E | 1.00 | 6.586 | 9.114 | 2.208 |
| | | 2.304 | 2.304 | 2.304 |

INITIAL MEAN VALUE -GAIN(DB) = 1.14X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 02-07-83

REF: JPL LOG 0839 DATE CODE 8238EM

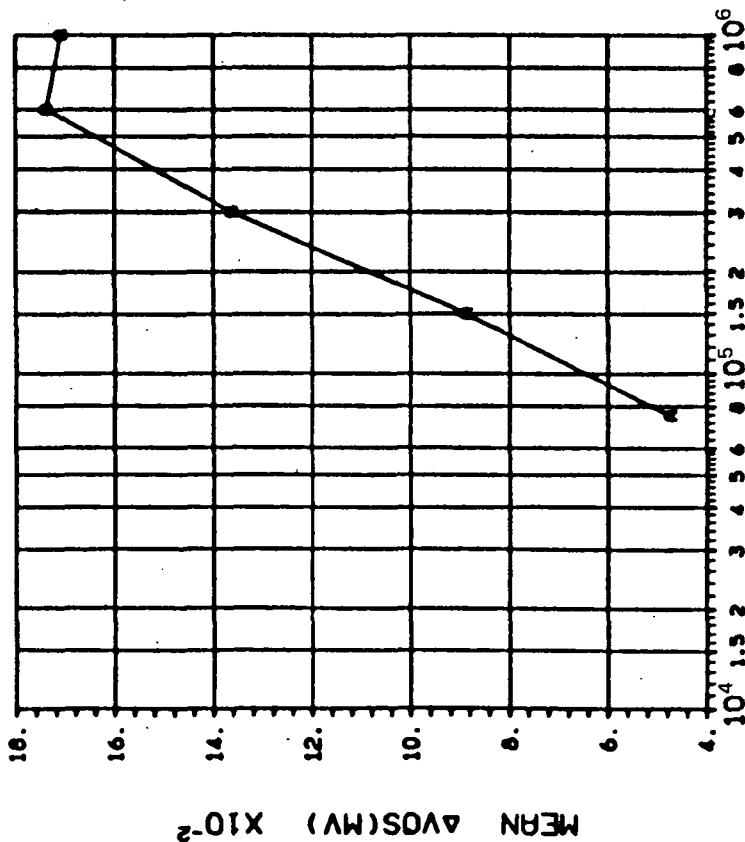


TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------------|
| A | 75 150 300 600 1000 |
| | .0256 .0575 .0970 .1622 .2233 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 02-07-83

REF: JPL LOG 0839 DATE CODE 8238EM

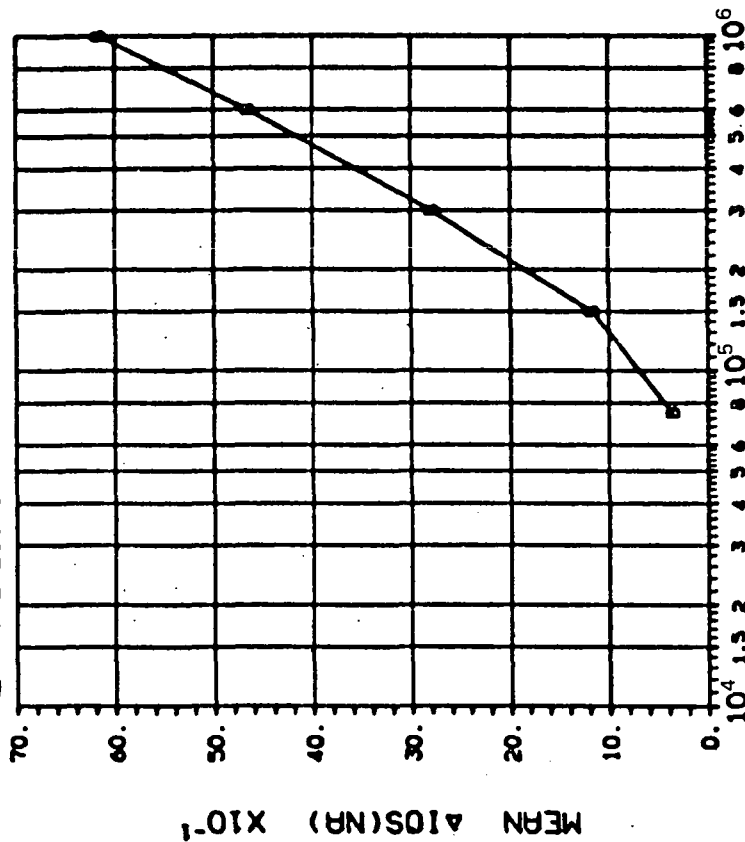


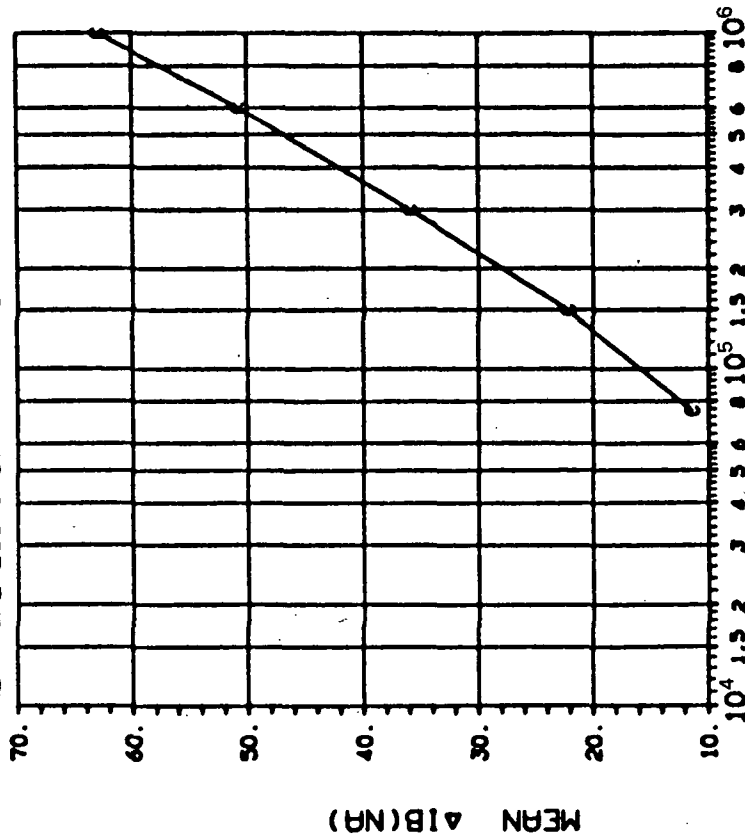
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------------|
| B | 75 150 300 600 1000 |
| | .1863 .4537 .7151 .8992 1.184 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 02-07-83

REF: JPL LOG 0839 DATE CODE 8238EM



DOSE, rads(Si) Co 60 Gammas

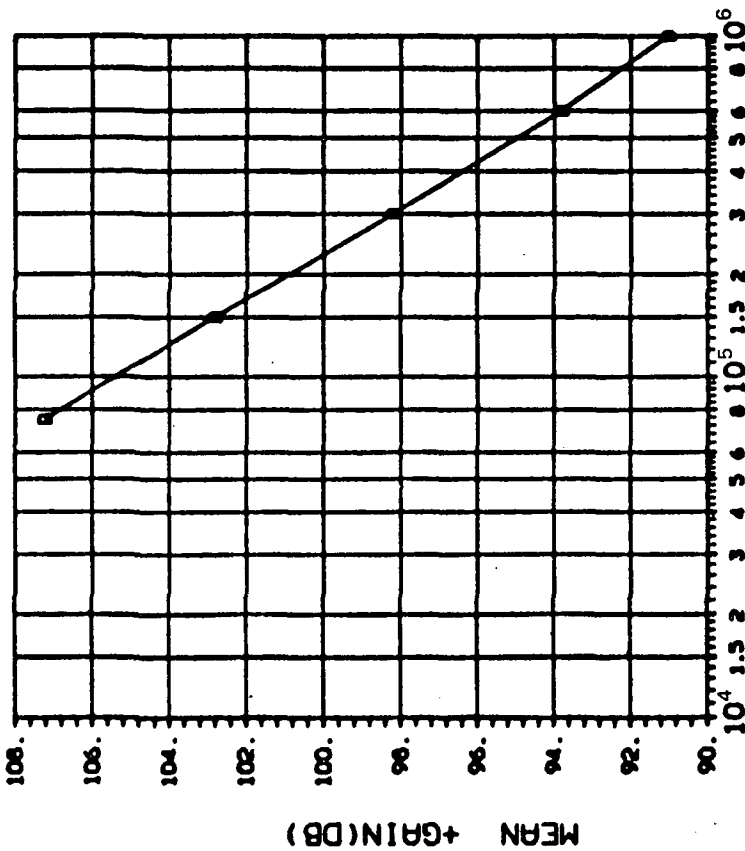
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 75 | 1.764 |
| | 150 | 3.284 |
| | 300 | 4.524 |
| | 600 | 5.575 |
| | 1000 | 6.457 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 5 DEVICES TEST DATE 02-07-83

REF: JPL LOG 0839 DATE CODE 8238EM



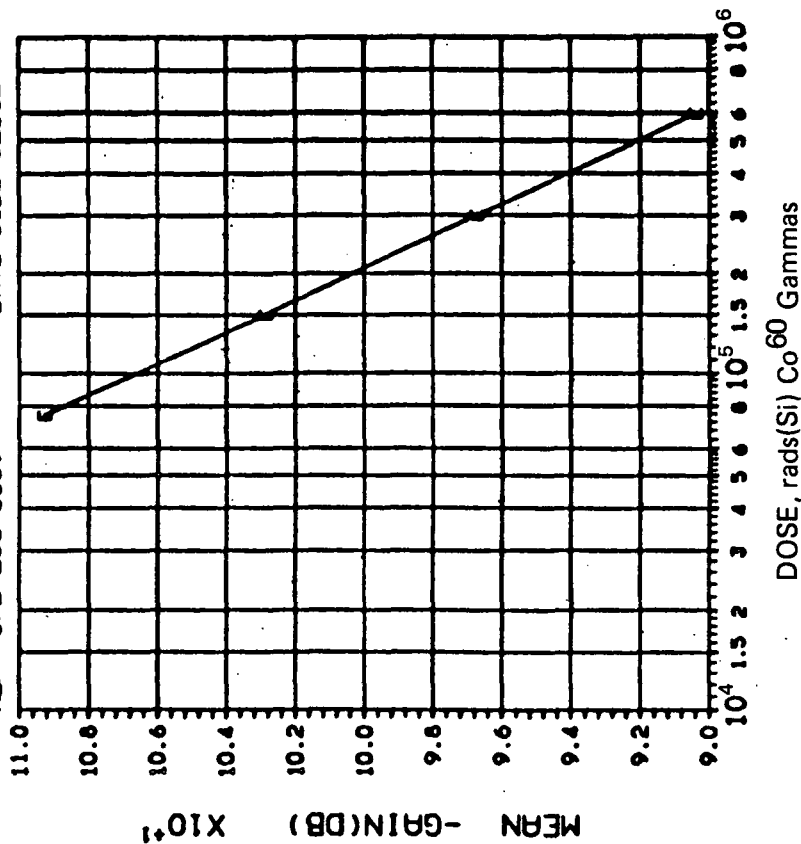
DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.0MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 |
| | | 150 |
| | | 300 |
| | | 600 |
| | | 1000 |

INITIAL MEAN VALUE +GAIN(DB) = 1.18X10⁺²

DEVICE TYPE: LM108 OP AMP
 MFG: AMD 5 DEVICES TEST DATE 02-07-83
 REF: JPL LOG 0639 DATE CODE 8238EH



(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

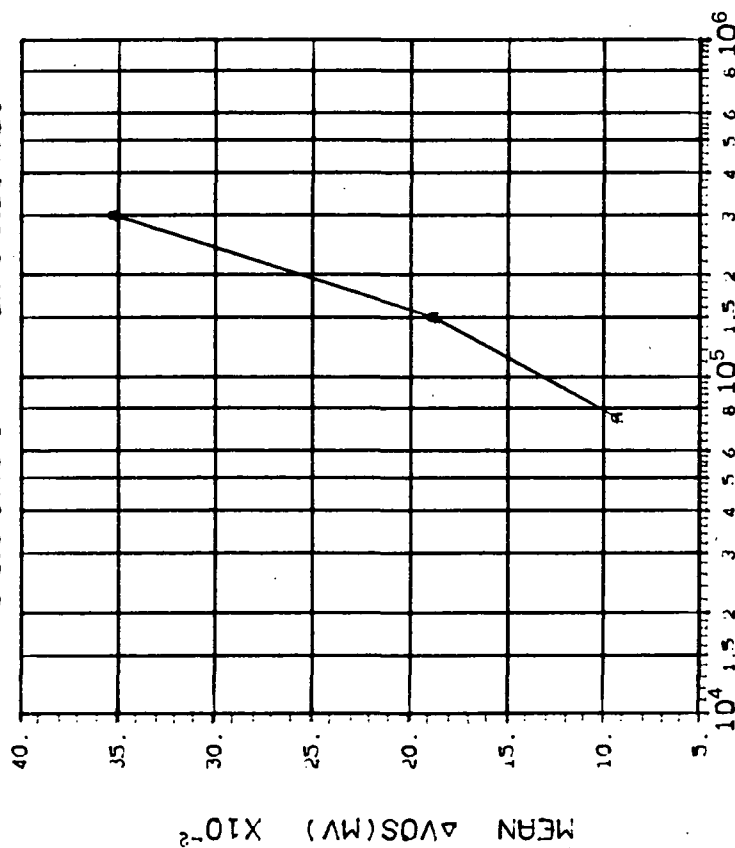
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|-------------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 1000 |
| | | 5.108 3.735 3.884 4.914 ##### |

INITIAL MEAN VALUE -GAIN(DB) = 1.16×10^{-2}

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-11-83

REF: TPL LOG 0996-1 DATE CODE FAB1

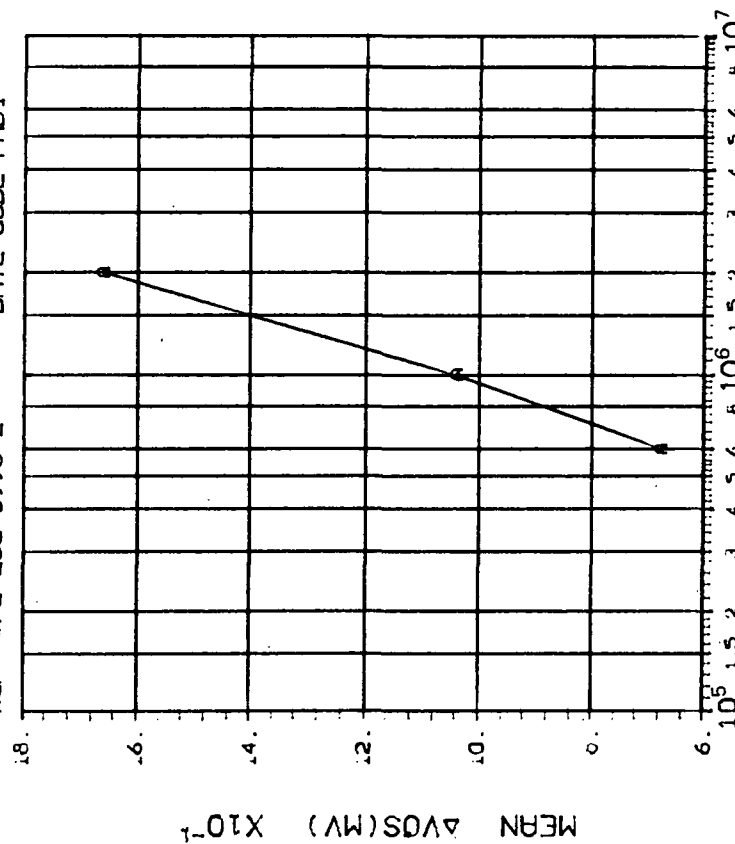


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 |
| | .2667 .1316 .2391 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-11-83

REF: TPL LOG 0996-2 DATE CODE FAB1

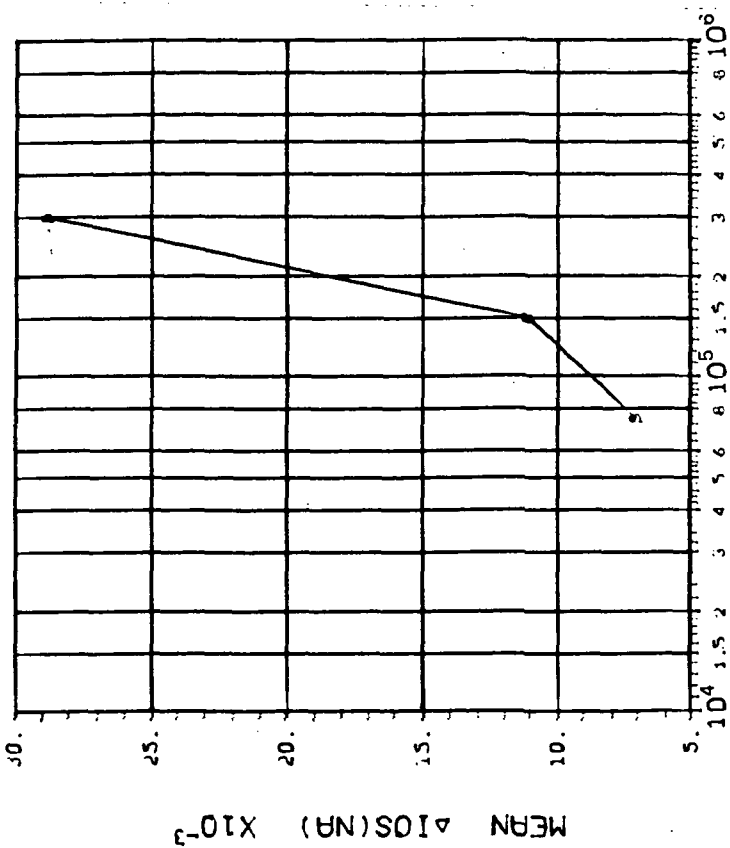


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 600 1000 2000 |
| | .4593 .6768 .6627 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD TEST DATE 03-11-83

REF: JPL LOG 0996-1 DATE CODE FAB1



DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NA): VS DOSE

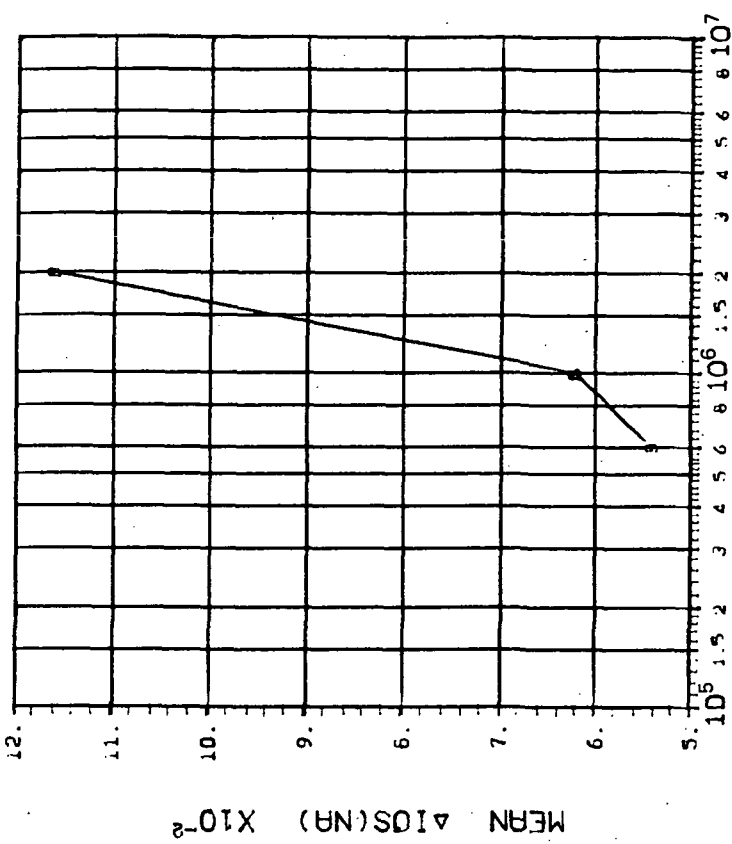
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|--------------------|
| B | 75 150 300 |
| | .0034 .0128 .0248 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD TEST DATE 03-11-83

REF: JPL LOG 0996-2 DATE CODE FAB1



DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NA): VS DOSE

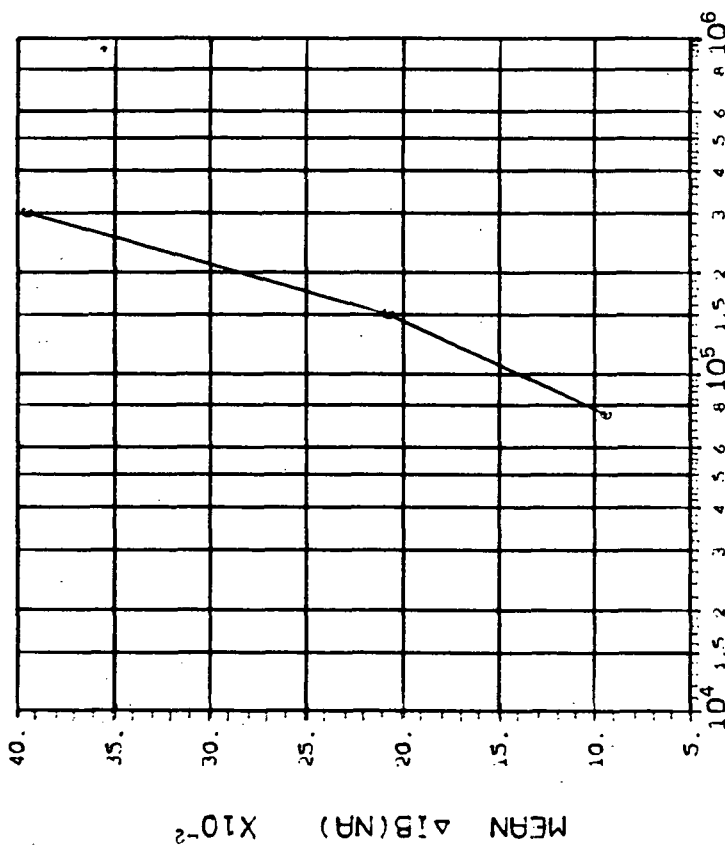
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|--------------------|
| B | 600 1000 2000 |
| | .0407 .0649 .1320 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD TEST DATE 03-11-83

REF: JPL LOG 0996-1 DATE CODE FB81



DOSE, rads(Si) 2.5 MeV electrons

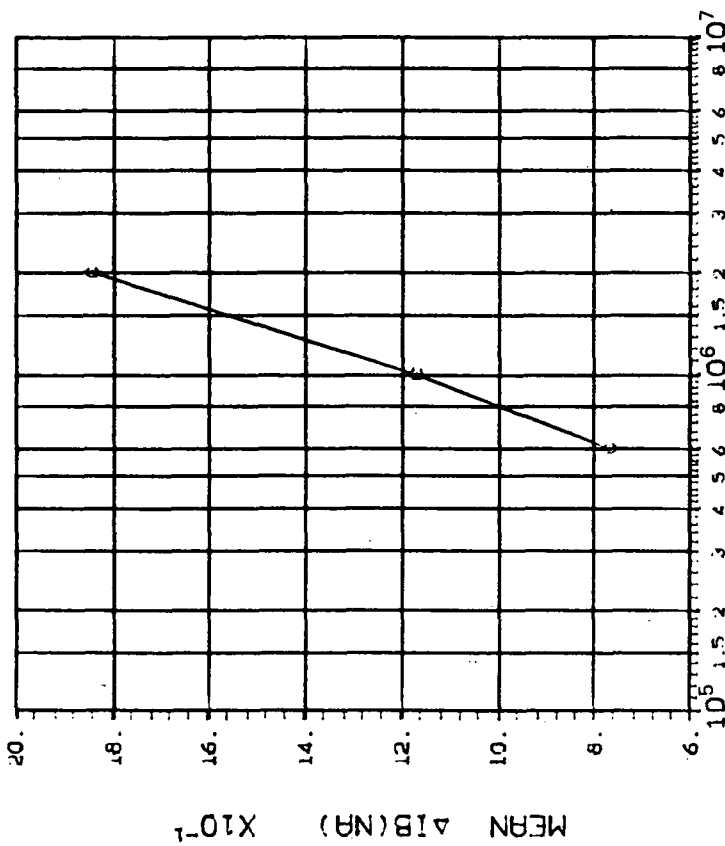
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 150 300 |
| | .0616 .1093 .1752 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD TEST DATE 03-11-83

REF: JPL LOG 0996-2 DATE CODE FB81



DOSE, rads(Si) 2.5 MeV electrons

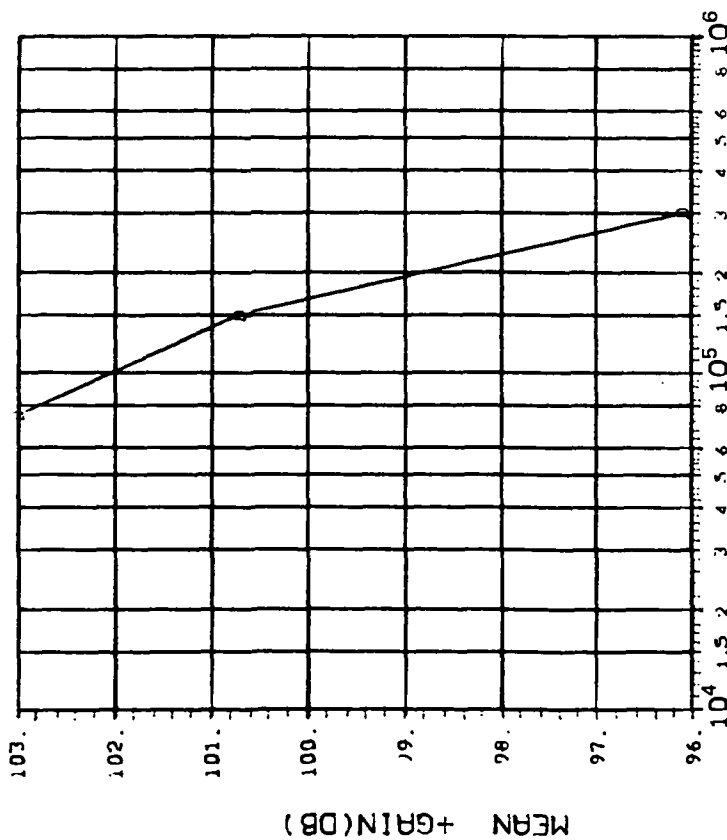
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 1000 2000 |
| | .2432 .3450 .4867 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0996-1 DATE CODE FAB1



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V) : VS DOSE

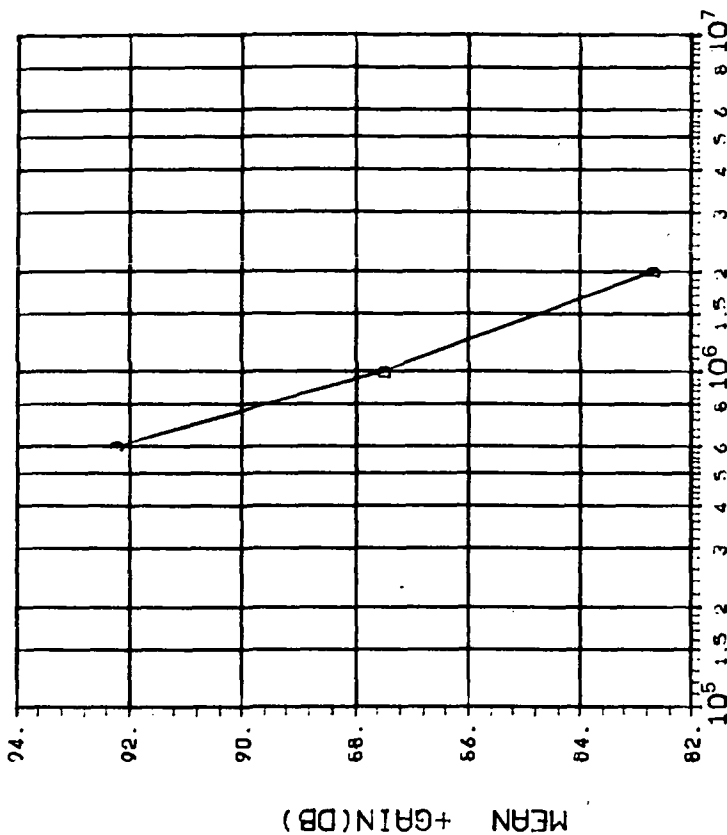
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 |
| | | 4.160 5.040 4.271 |

INITIAL MEAN VALUE +GAIN(DB) = 1.06X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-11-83

REF: JPL LOG 0996-2 DATE CODE FAB1



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V) : VS DOSE

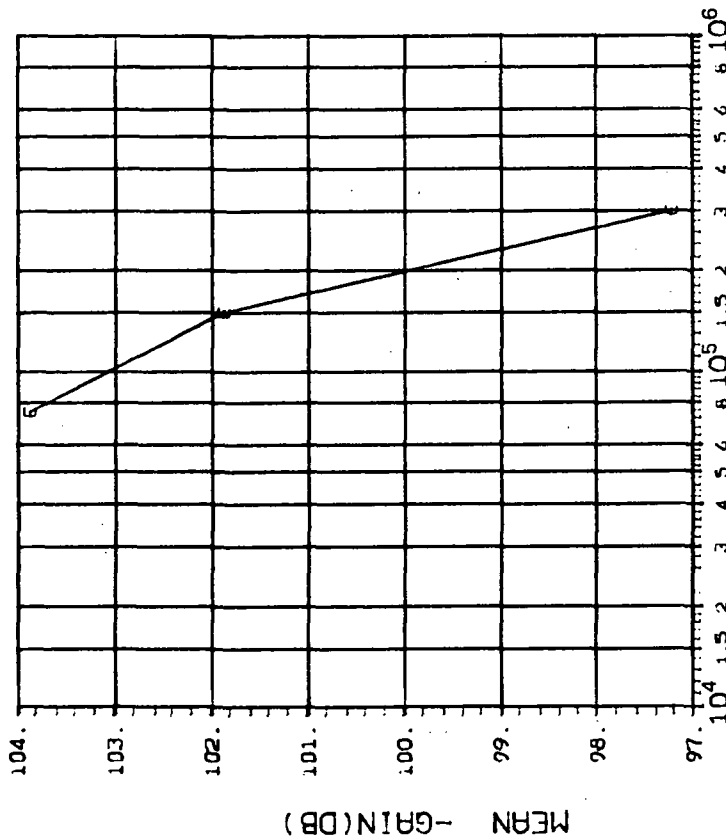
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 600 1000 2000 |
| | | 4.664 2.092 1.186 |

INITIAL MEAN VALUE +GAIN(DB) = 1.06X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-11-83

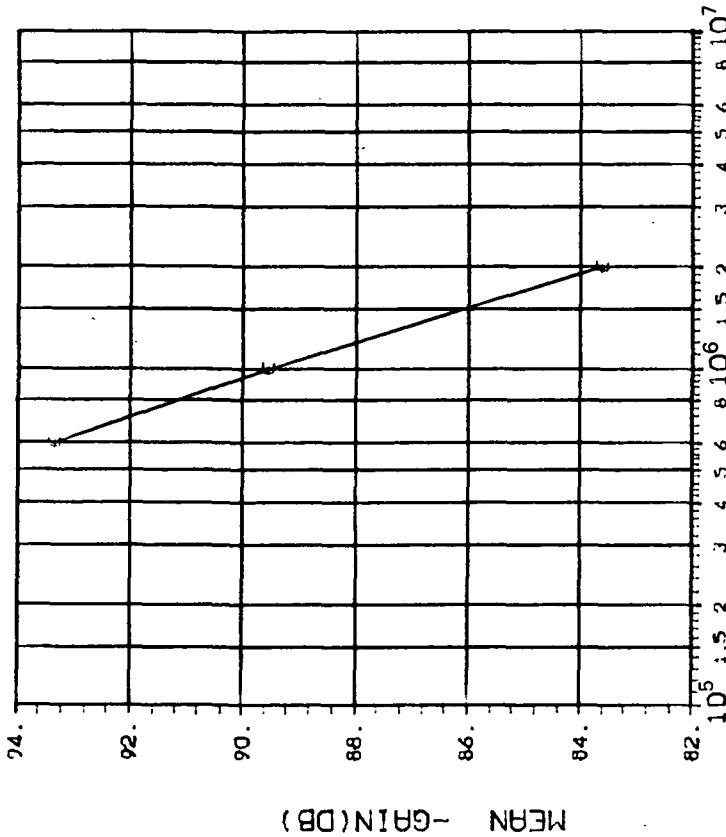
REF: JPL LOG 0996-1 DATE CODE FAB1



DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-11-83

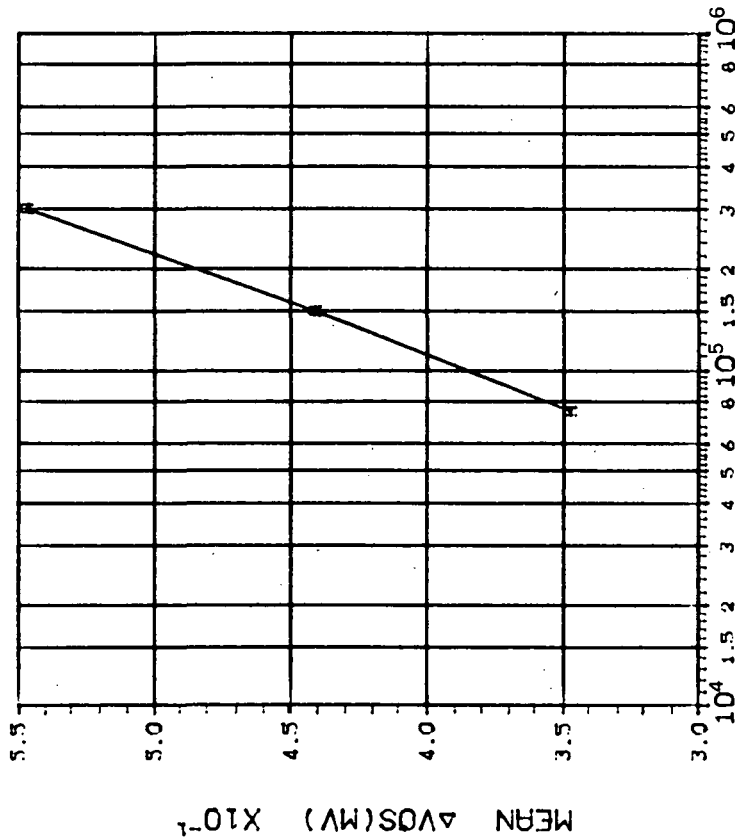
REF: JPL LOG 0996-2 DATE CODE FAB1



DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0997-1 DATE CODE FAB2



DOSE, rads(Si) 2.5 MeV electrons

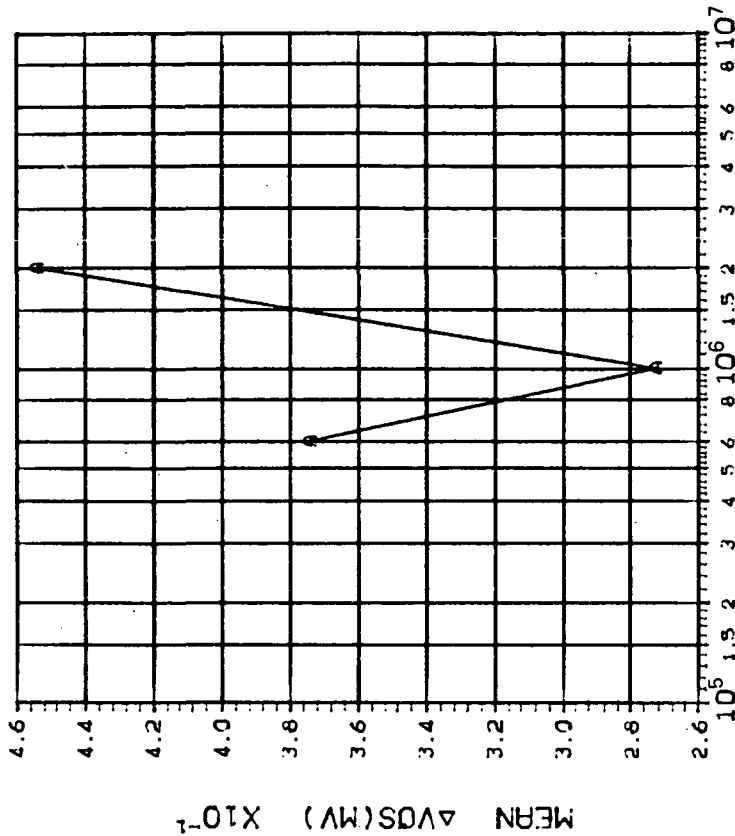
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 300 |
| A | .3224 | .4024 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0997-2 DATE CODE FAB2



DOSE, rads(Si) 2.5 MeV electrons

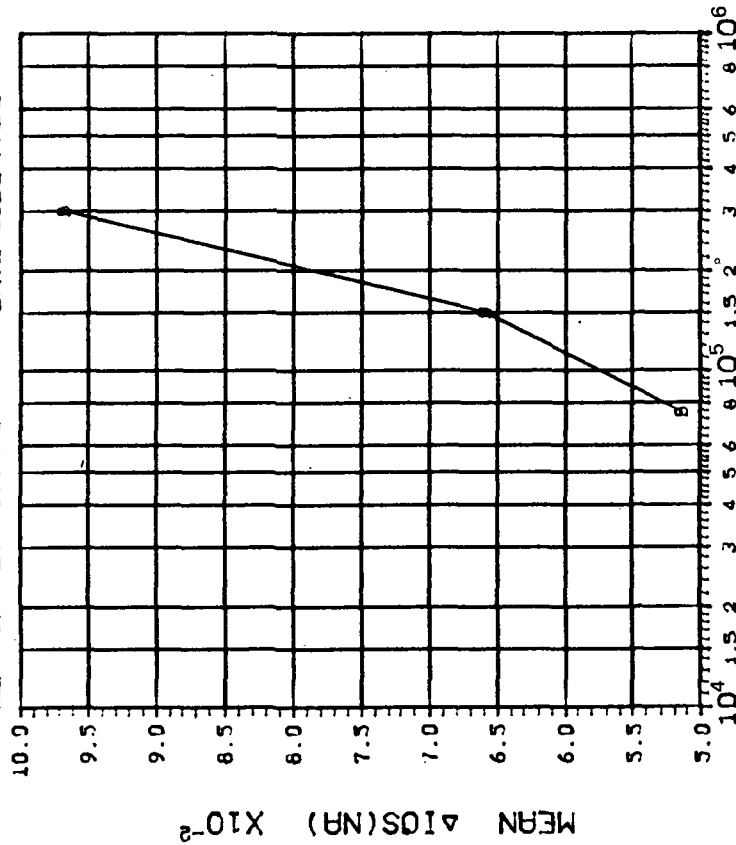
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 600 | 2000 |
| A | .3849 | .2271 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0997-1 DATE CODE FAB2



DOSE, rads(Si) 2.5 MeV electrons

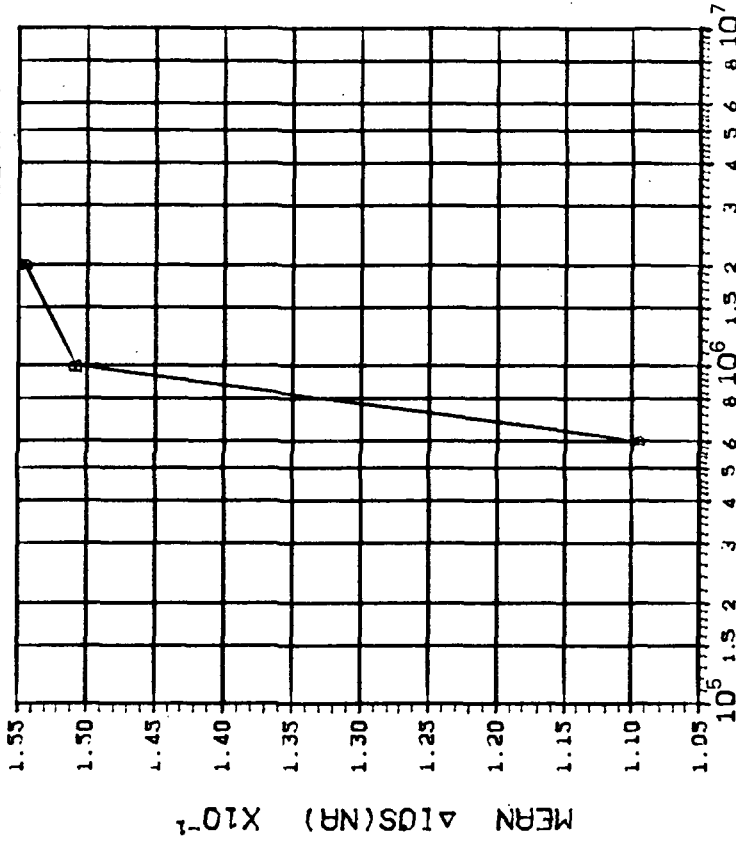
(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 300 |
| B | .0236 | .0409 .0738 |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0997-2 DATE CODE FAB2



DOSE, rads(Si) 2.5 MeV electrons

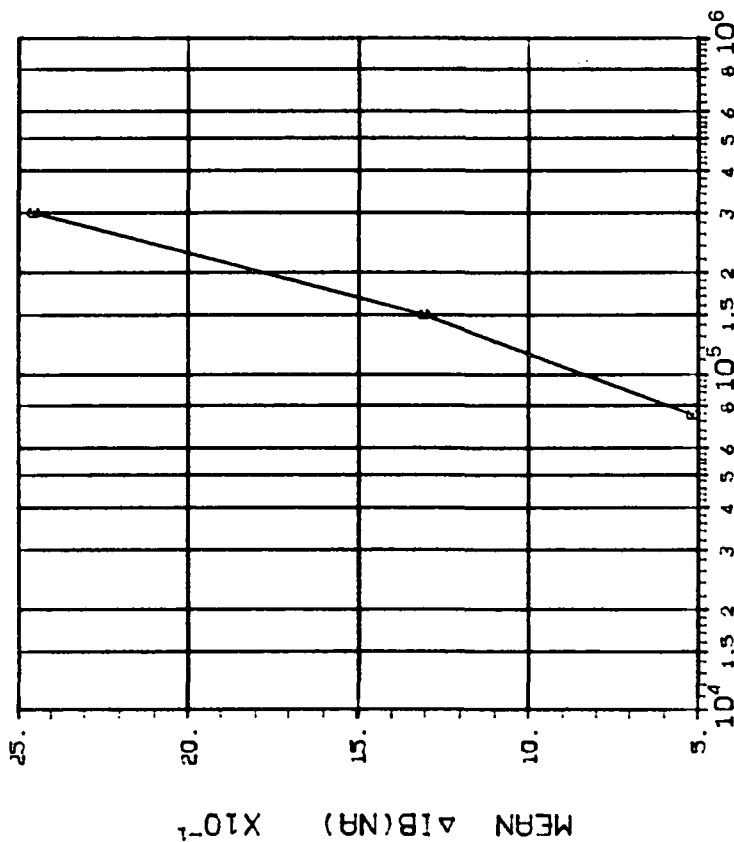
(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 600 | 2000 |
| B | .0913 | .1094 .1115 |

DEVICE TYPE: LM108 OP AMP

MFG: QMD 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0997-1 DATE CODE FAB2

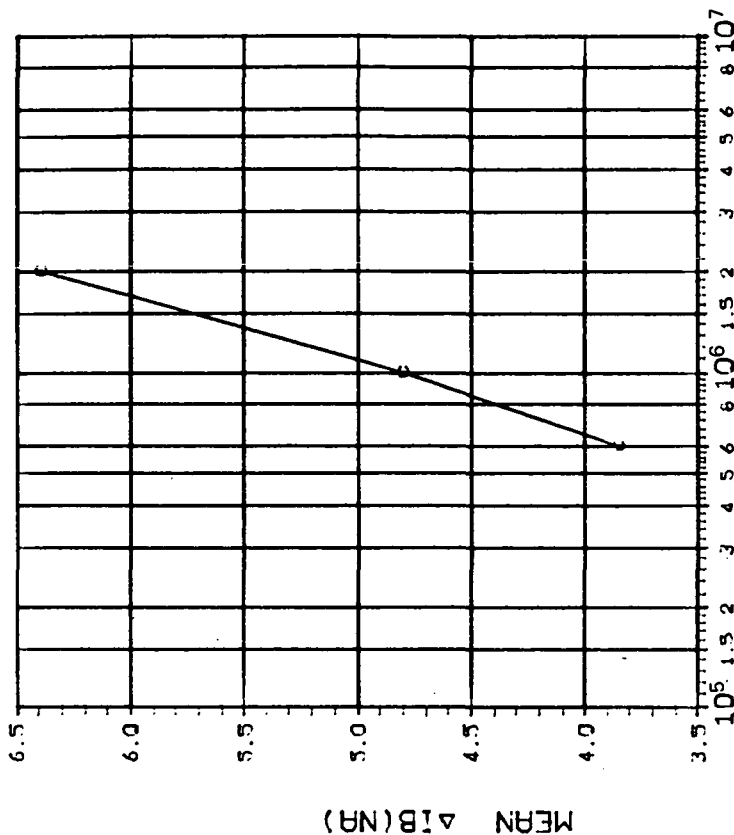


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| .4934 .4395 .3531 | |

DEVICE TYPE: LM108 OP AMP

MFG: QMD 4 DEVICES TEST DATE 03-10-83

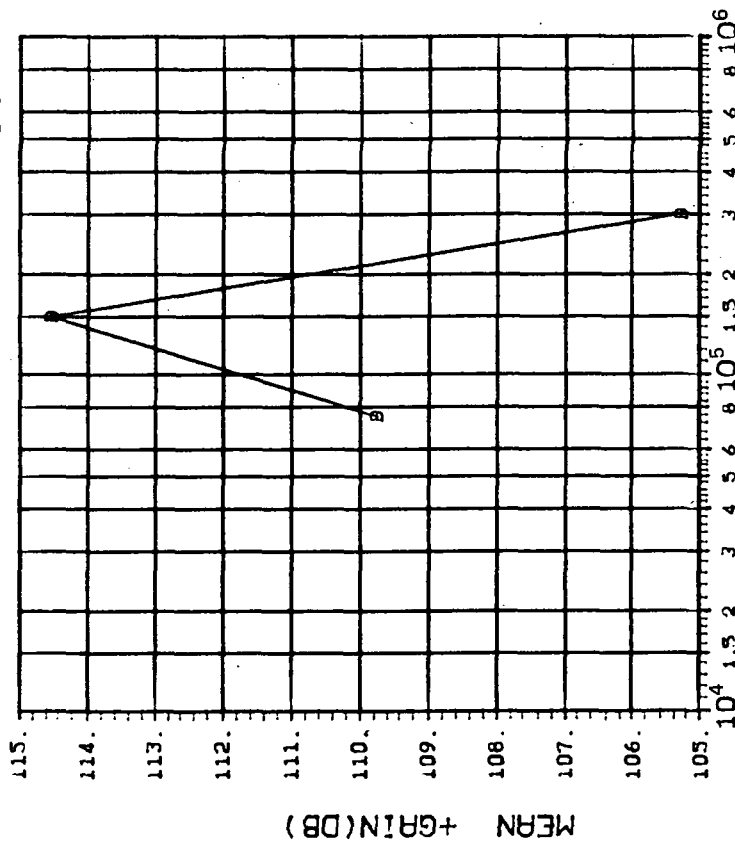
REF: JPL LOG 0997-2 DATE CODE FAB2



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 600 |
| | 1000 |
| | 2000 |
| .2716 .2147 .2208 | |

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83
REF: JPL LOG 0997-1 DATE CODE FAB2



DOSE, rads(Si) 2.5 MeV electrons

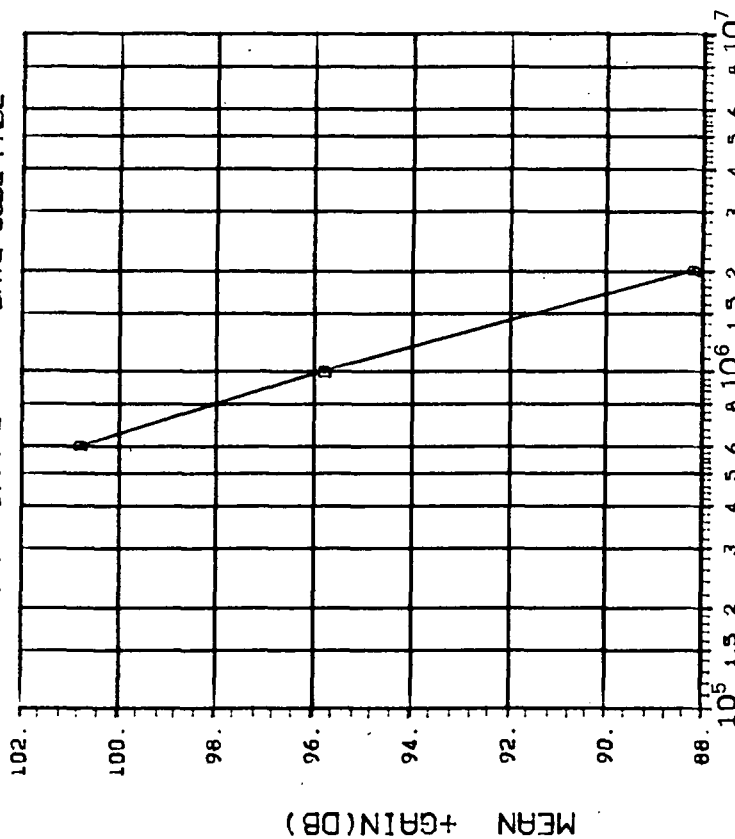
(4)+GAIN IN DB(1.1MA LOAD, +10V) : VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 |
| | | 11.28 11.24 11.71 |

INITIAL MEAN VALUE +GAIN(DB) = 1.11X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83
REF: JPL LOG 0997-2 DATE CODE FAB2



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.1MA LOAD, +10V) : VS DOSE

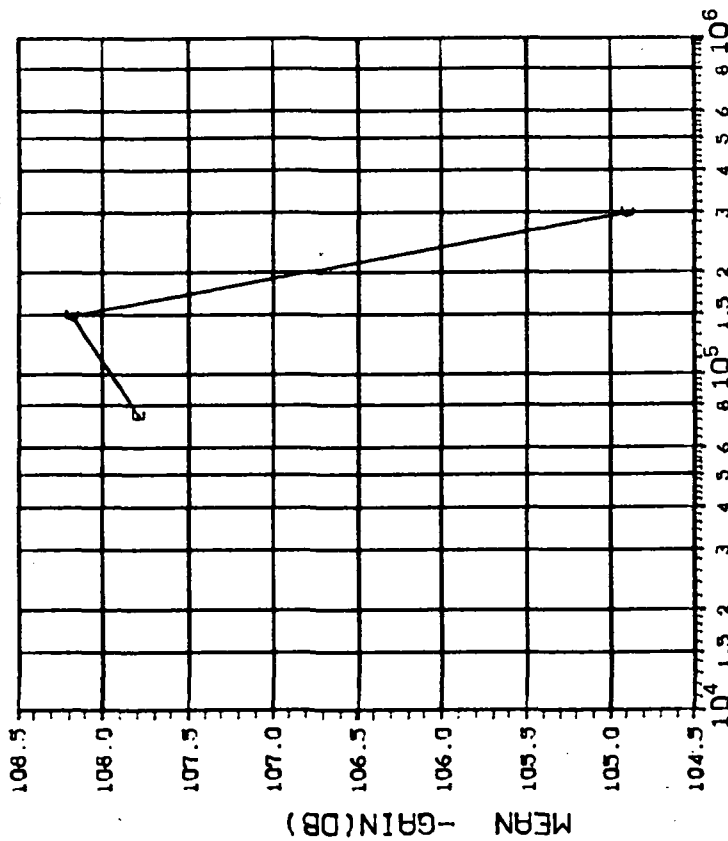
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 600 1000 2000 |
| | | 6.653 2.670 1.621 |

INITIAL MEAN VALUE +GAIN(DB) = 1.11X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0997-1 DATE CODE FAB2



DOSE, rads(Si) 2.5 MeV electrons

(S)-GAIN IN DB (1.MA LOAD, -10V): VS DOSE

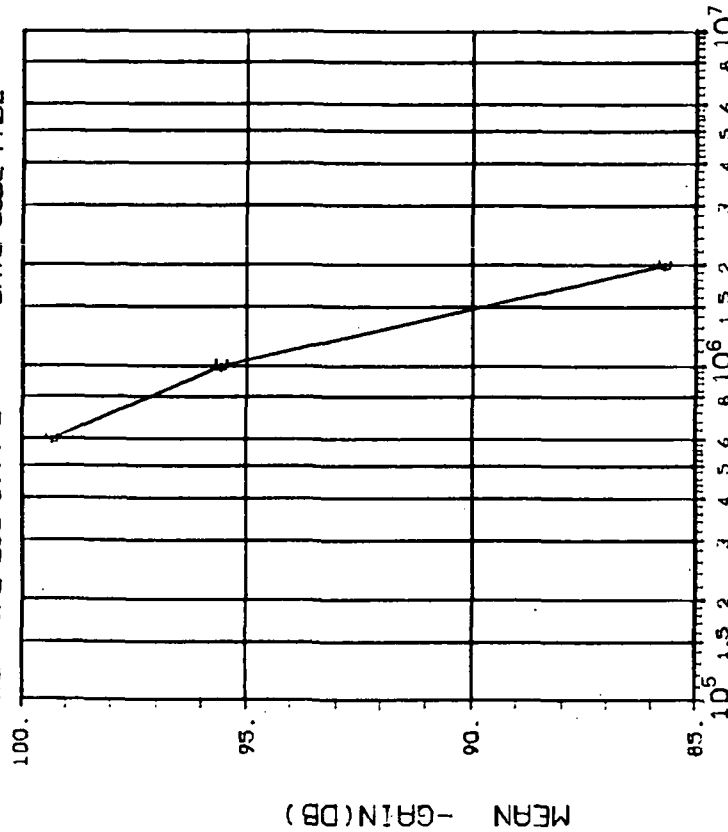
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 |
| | | 8.352 11.19 14.94 |

INITIAL MEAN VALUE -GAIN(DB) = 1.11X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: AMD 4 DEVICES TEST DATE 03-10-83

REF: JPL LOG 0997-2 DATE CODE FAB2



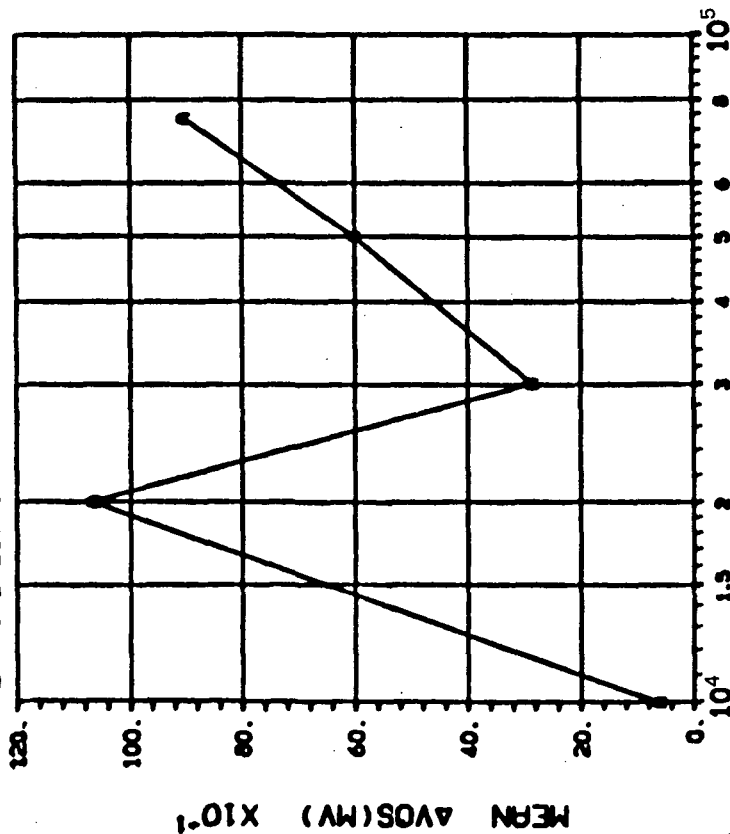
DOSE, rads(Si) 2.5 MeV electrons

(S)-GAIN IN DB (1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 600 1000 2000 |
| | | 10.60 4.605 1.673 |

INITIAL MEAN VALUE -GAIN(DB) = 1.11X10⁺²

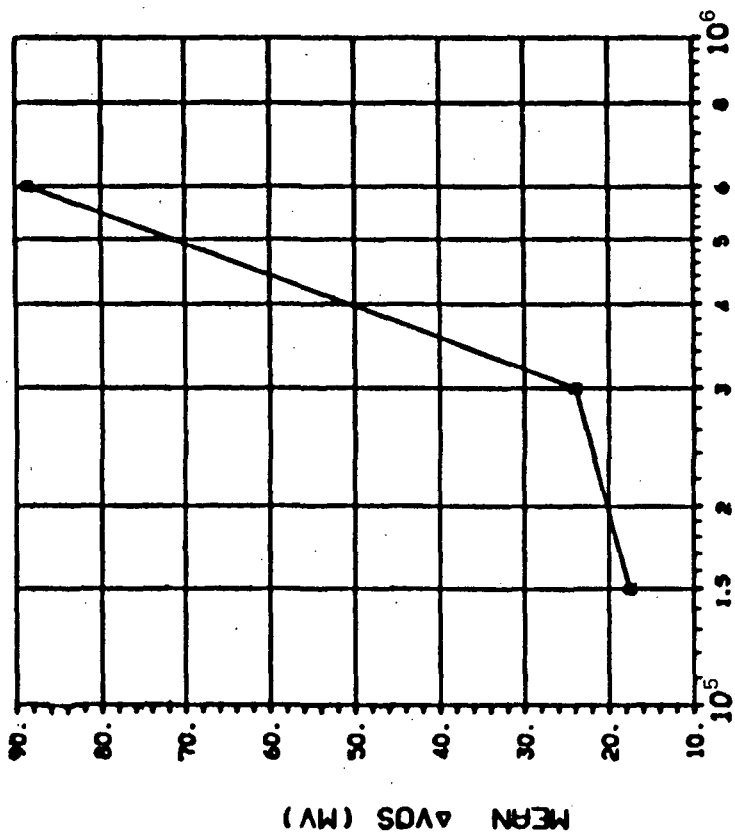
DEVICE TYPE: LM108 OP AMP
 MFG: FSC 4 DEVICES TEST DATE 01-18-83
 REF: JPL LOG 0911 DATE CODE 8223



DOSE, rads(Si) 2.5 MeV electrons
 (1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 |
| A | .1548 | 11.48 | 1.265 |
| | | | 3.391 |
| | | | 5.680 |

DEVICE TYPE: LM108 OP AMP
 MFG: FSC 4 DEVICES TEST DATE 1-18-83
 REF: JPL LOG 0911 DATE CODE 8223



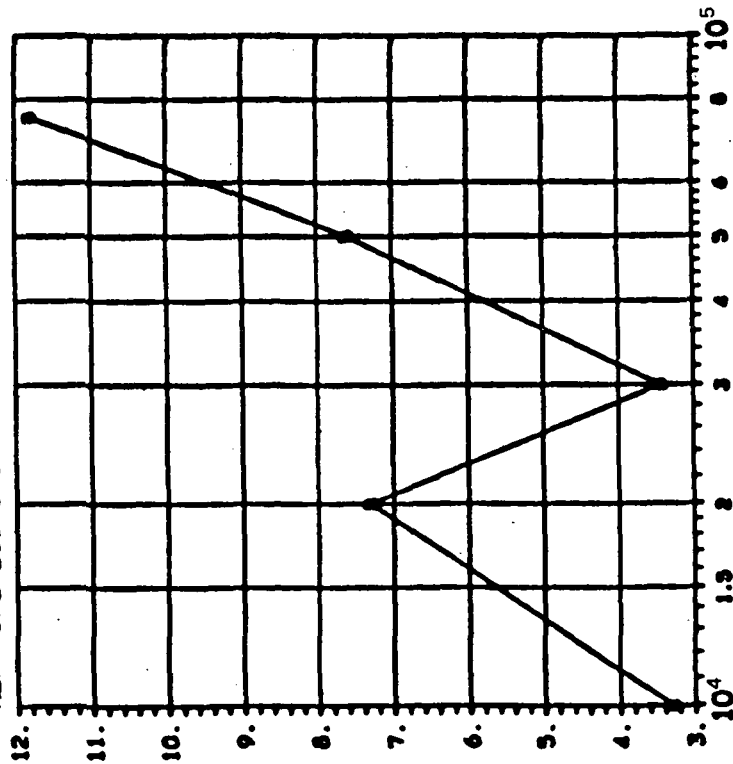
DOSE, rads(Si) 2.5 MeV electrons
 (1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 150 | 300 | 600 |
| A | 12.17 | 17.66 | .3612 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 4 DEVICES TEST DATE 01-18-83

REF: JPL LOG 0911 DATE CODE 8223



DOSE, rads(Si) 2.5 MeV electrons

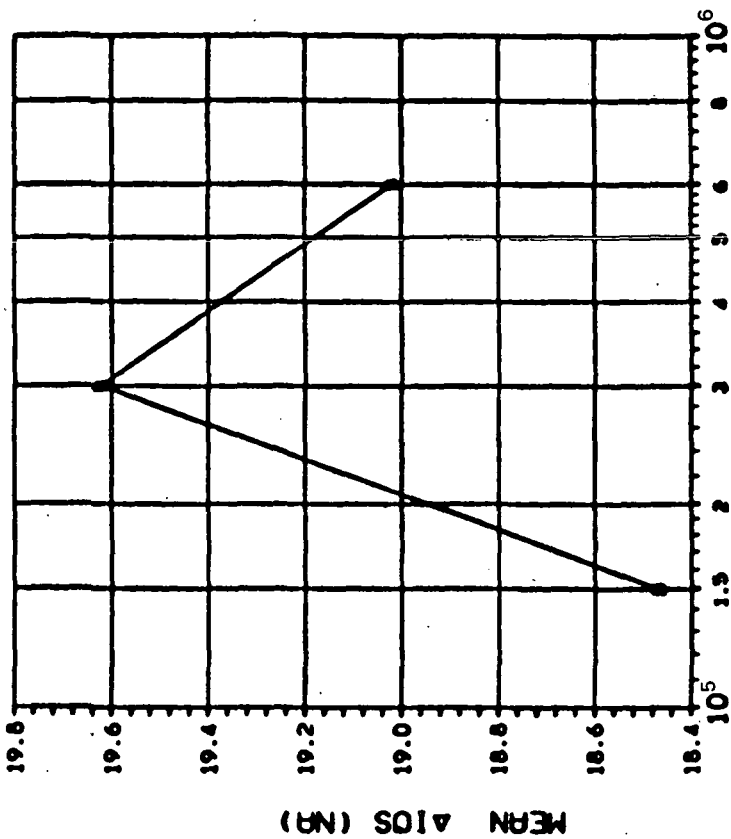
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 |
| B | 5.325 | 11.80 | 1.667 |
| | 2.330 | 4.163 | |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 4 DEVICES TEST DATE 1-18-83

REF: JPL LOG 0911 DATE CODE 8223



DOSE, rads(Si) 2.5 MeV electrons

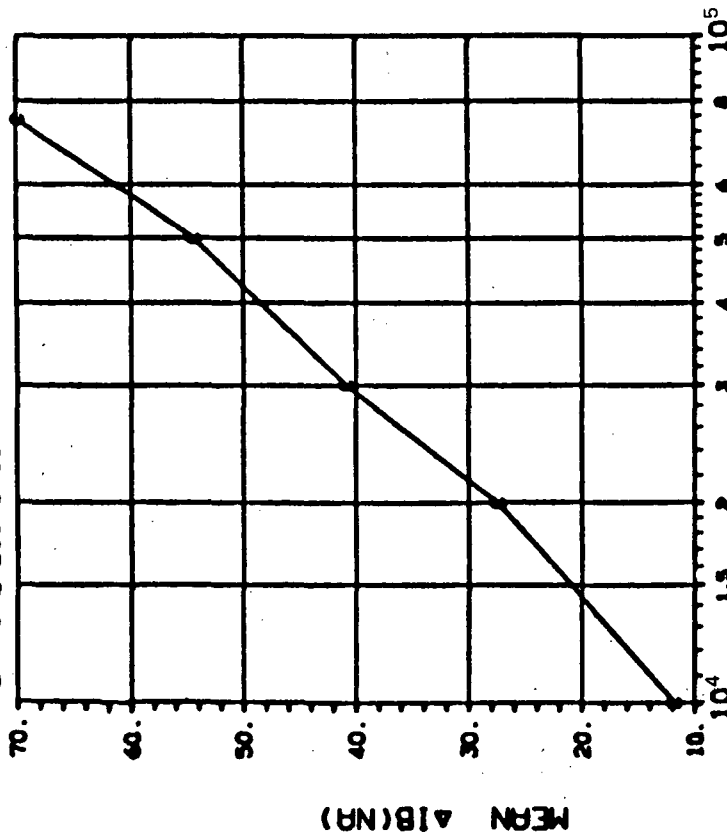
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 150 | 300 | 600 |
| B | 8.641 | 9.736 | 5.159 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 4 DEVICES TEST DATE 01-18-83

REF: JPL LOG 0911 DATE CODE 8223

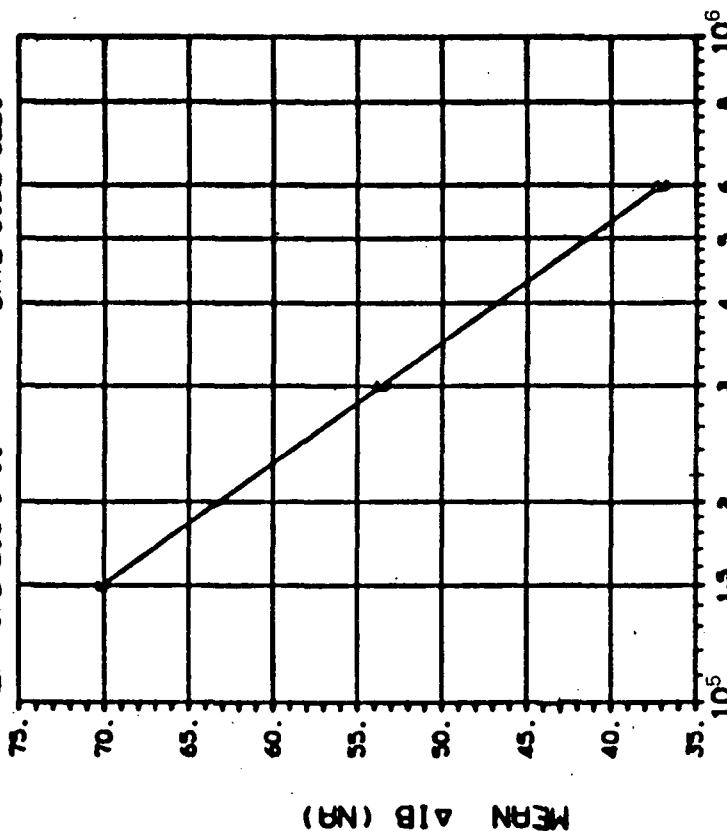


| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 |
| C | 5.081 | 10.49 | 14.41 |
| | 27.54 | 13.00 | |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 4 DEVICES TEST DATE 1-18-83

REF: JPL LOG 0911 DATE CODE 8223



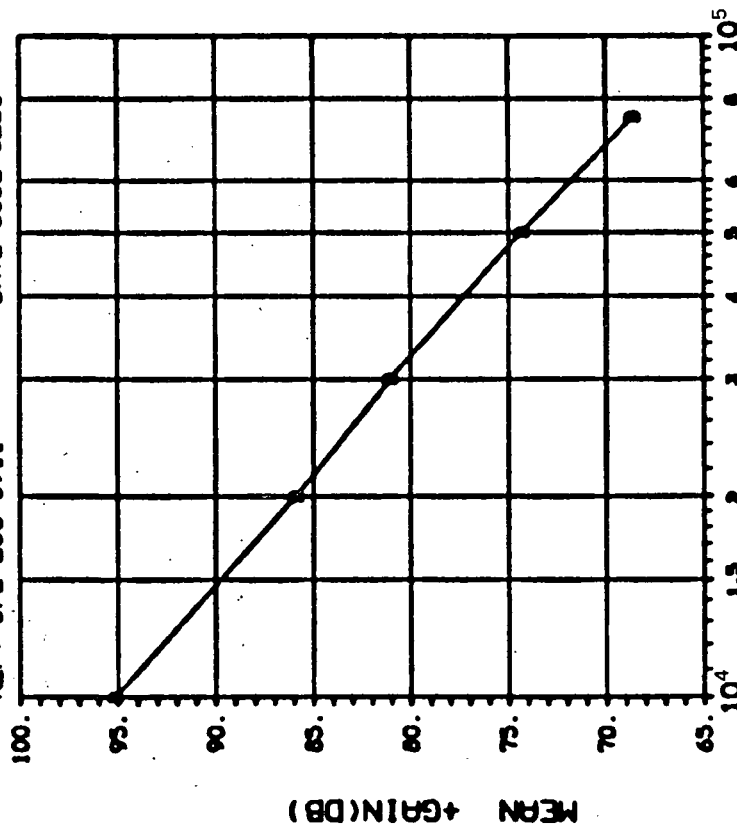
| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 150 | 300 | 600 |
| C | 9.451 | 11.57 | 45.12 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC TEST DATE 01-18-83

4 DEVICES

REF: JPL LOG 0911 DATE CODE 8223



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|-------------------------------|--|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| D | 1.00 | 10 20 30 50 75 | |
| | | 1.190 2.617 4.851 .6599 5.312 | |

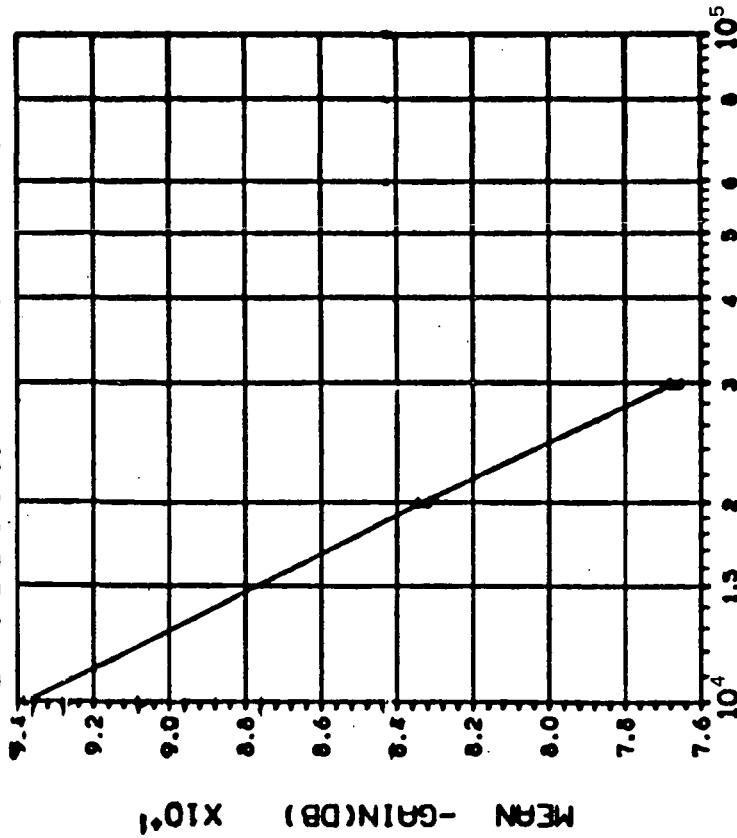
INITIAL MEAN VALUE +GAIN(DB) = $1.12 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: FSC TEST DATE 01-18-83

4 DEVICES

REF: JPL LOG 0911 DATE CODE 8223



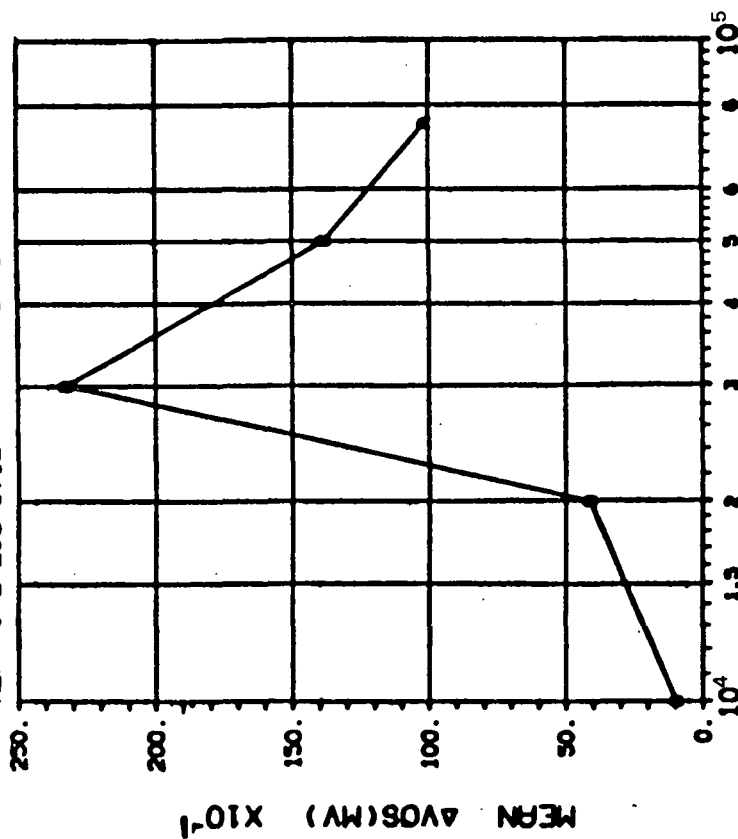
DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(1.MA LOAD,-10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|-------------------------|--|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| E | 1.00 | 10 20 30 50 75 | |
| | | 2.106 2.485 2.433 ***** | |

INITIAL MEAN VALUE -GAIN(DB) = $1.10 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP
 MFG: FSC 3 DEVICES TEST DATE 01-18-83
 REF: JPL LOG D912 DATE CODE 8223

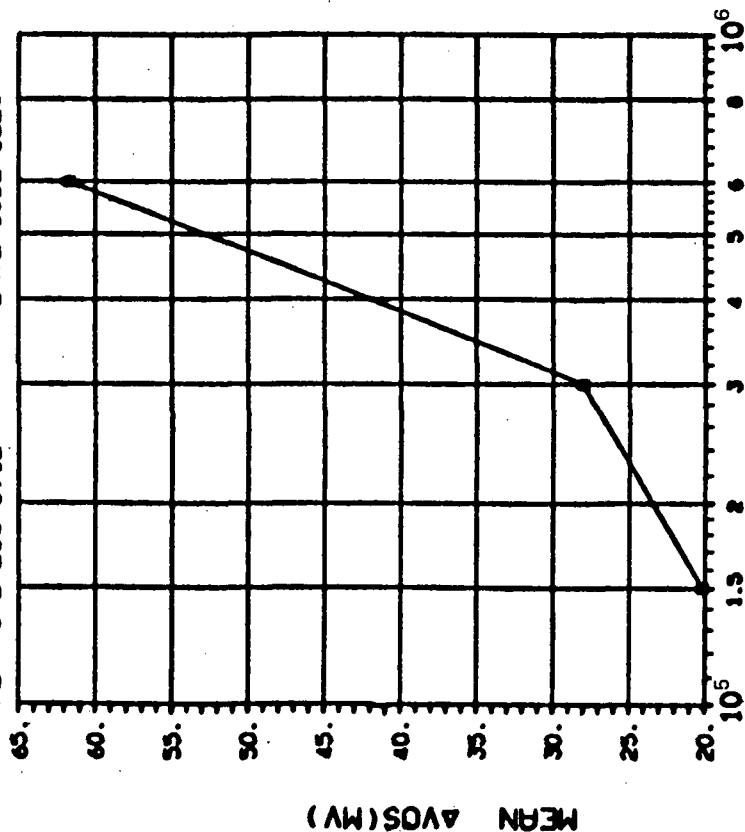


DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| A | .7651 | 16.82 | 20.41 | 18.46 |
| | | | | 6.537 |

DEVICE TYPE: LM108 OP AMP
 MFG: FSC 3 DEVICES TEST DATE 01-18-83
 REF: JPL LOG 0912 DATE CODE 8223



DOSE, rads(Si) 2.5 MeV electrons

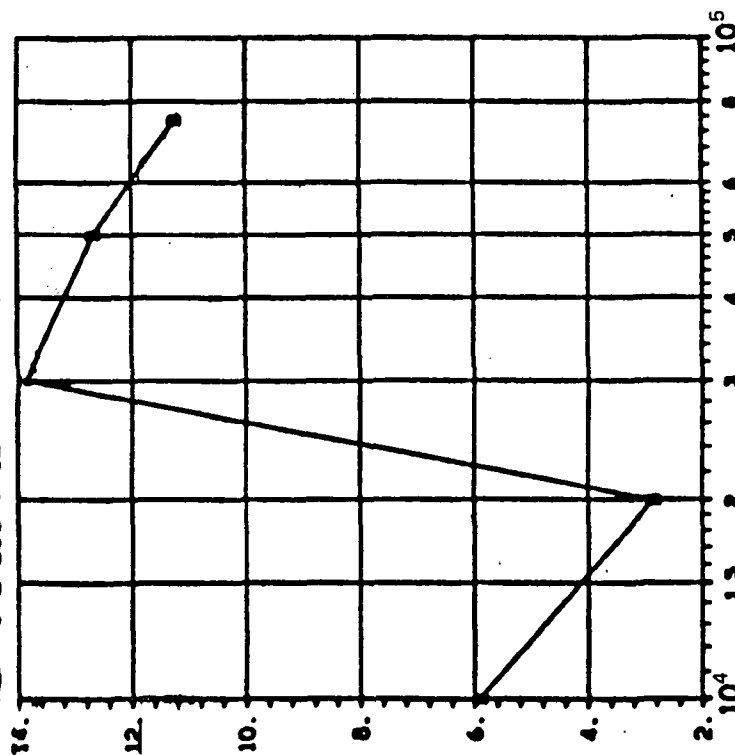
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| | 150 | 300 |
| A | 14.94 | 21.85 |
| | | 26.19 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 3 DEVICES TEST DATE 01-18-83

REF: JPL LOG 0912 DATE CODE 8223



MEAN ΔIOS(NA)

DOSE, rads(Si) 2.5 MeV electrons

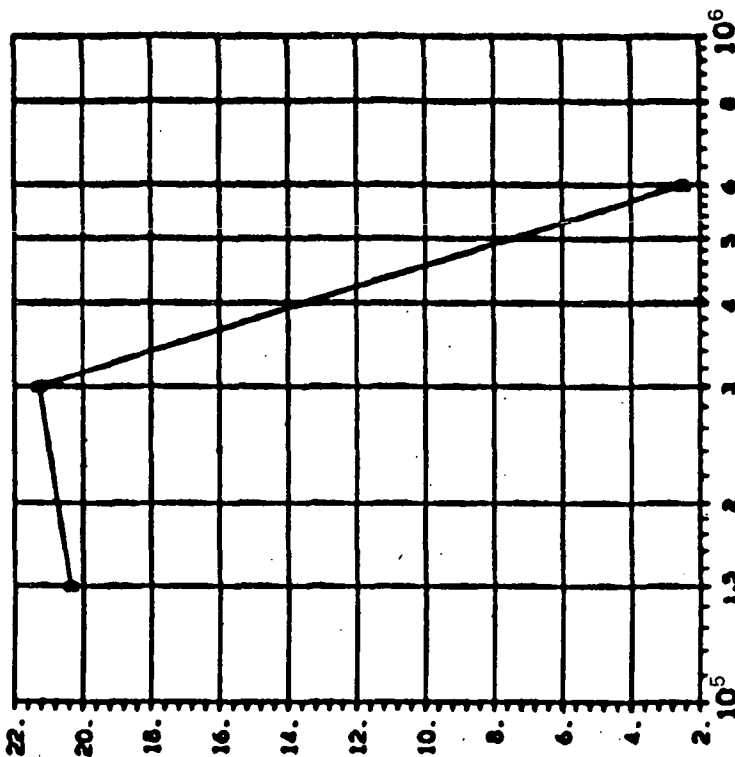
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 10 | 20 | 30 |
| B | 6.421 | 4.343 | 27.41 |
| | 12.53 | 7.076 | |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 3 DEVICES TEST DATE 01-18-83

REF: JPL LOG 0912 DATE CODE 8223



MEAN ΔIOS(NA)

DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|--------------------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | |
| | 150 | 300 | 600 |
| B | 12.17 | 12.30 | 37.26 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC

3 DEVICES

TEST DATE 01-18-83

REF: JPL LOG 0912

DATE CODE 8223

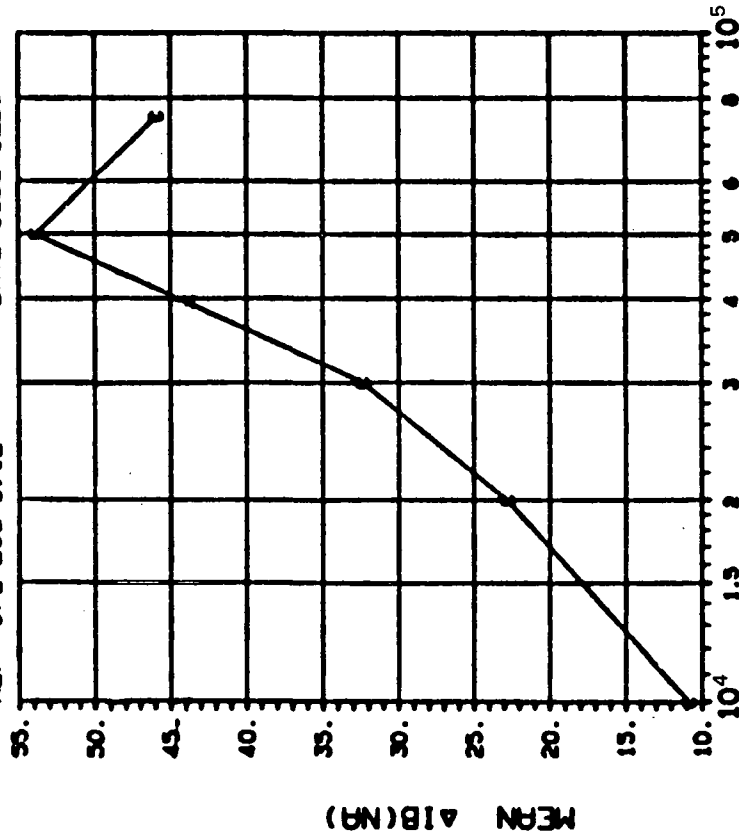


TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | | |
|-------|--------------------|-------|-------|-------|-------|
| | 10 | 20 | 30 | 50 | 75 |
| C | 1.755 | 8.680 | 10.65 | 16.03 | 24.77 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC

3 DEVICES

TEST DATE 01-18-83

REF: JPL LOG 0912

DATE CODE 8223

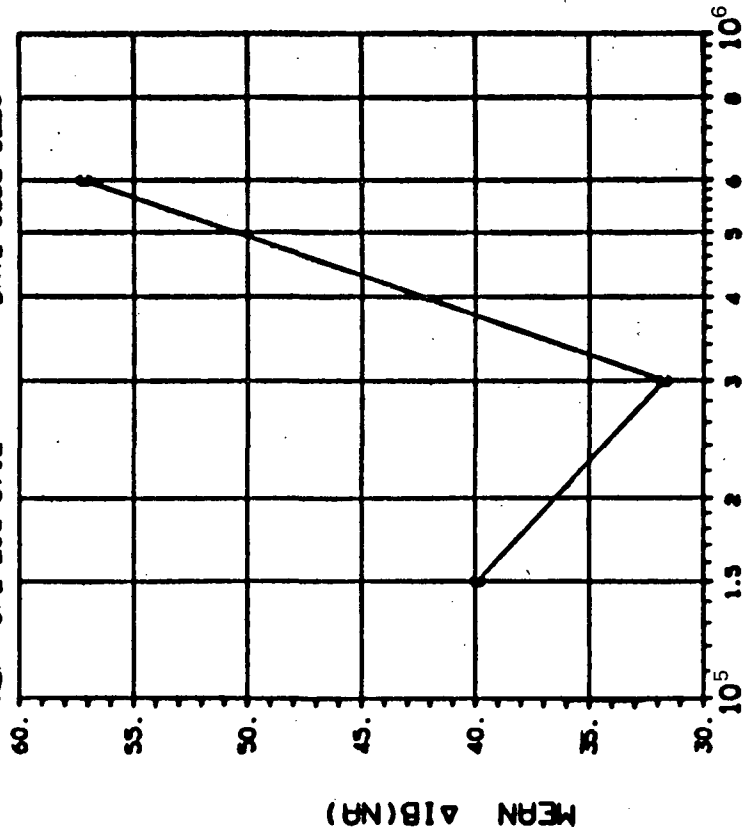


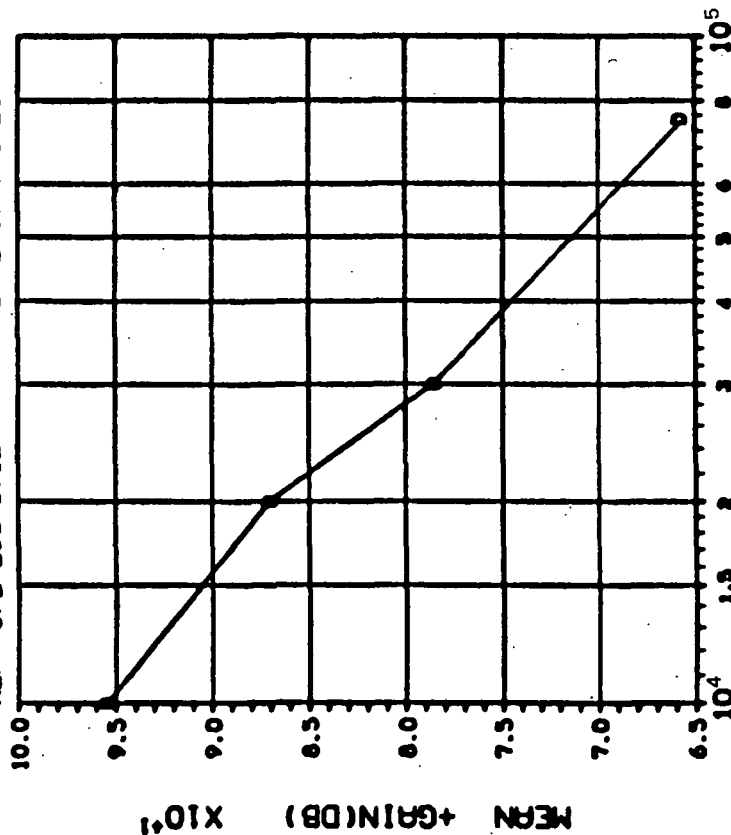
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | |
|-------|--------------------|-------|-------|
| | 150 | 300 | 600 |
| C | 24.97 | 22.94 | 26.06 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 01-18-83

REF: JPL LOG 0912 DATE CODE 8223



DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

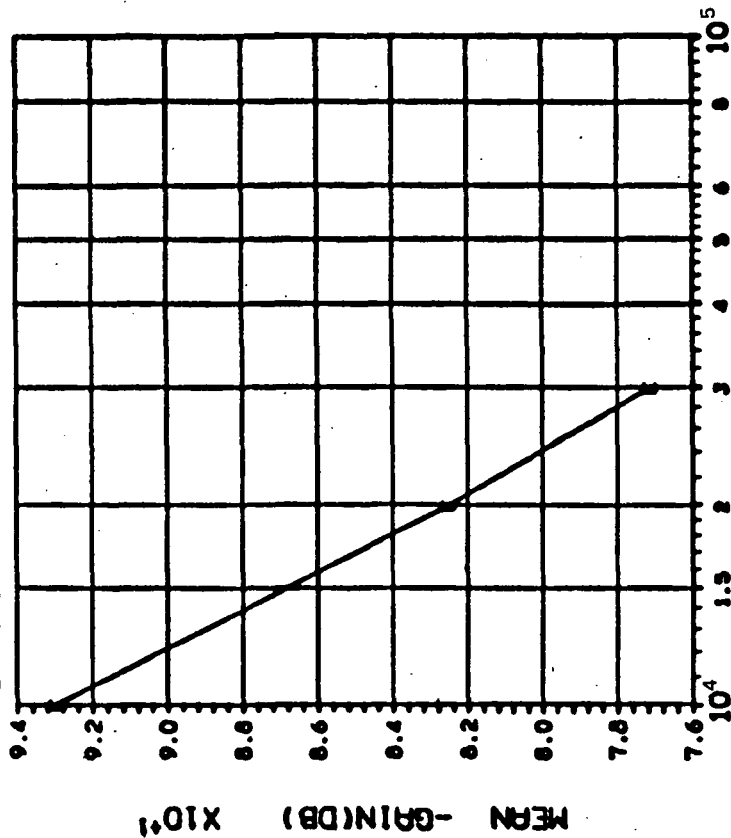
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| | | 10 | 20 | 30 |
| D | 1.00 | 5.182 | 8.826 | 7.841 |
| | | ##### | ##### | ##### |
| | | 6.110 | | |

INITIAL MEAN VALUE +GAIN(DB) = $1.10 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 01-18-83

REF: JPL LOG 0912 DATE CODE 8223



DOSE, rads(Si) 2.5 MeV electrons

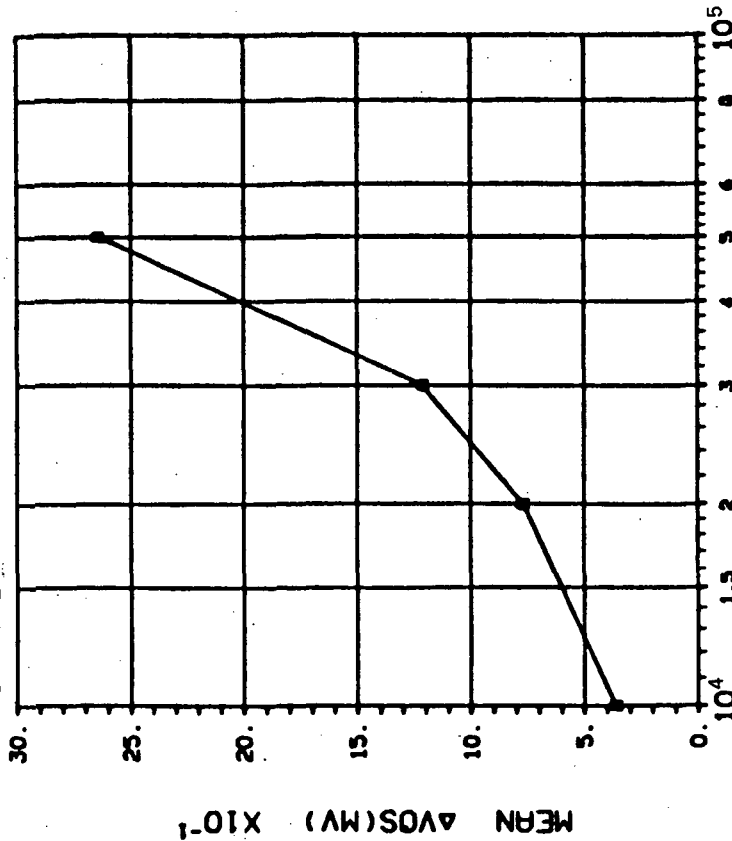
(5)-GAIN IN DB(1.MA LOAD,-10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| | | 10 | 20 | 30 |
| E | 1.00 | 5.524 | 7.542 | 9.410 |
| | | ##### | ##### | ##### |

INITIAL MEAN VALUE -GAIN(DB) = $1.10 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-15-83
REF: JPL LOG 0913 DATE CODE 8223



DOSE, rads(Si) Co 60 Gammas

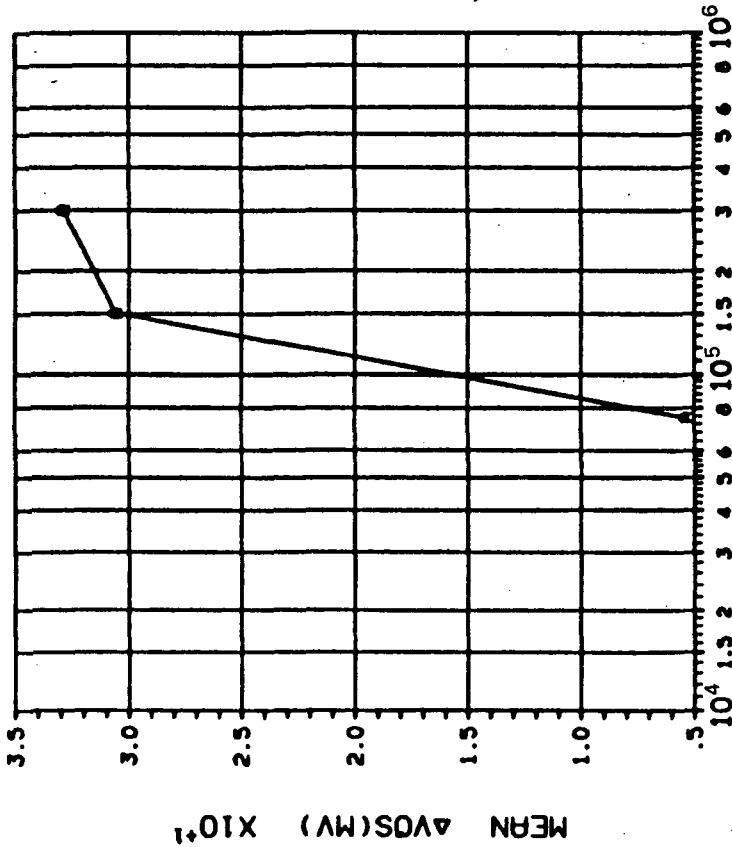
(1)ΔVOS(MV): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 10 20 30 50 |
| | .1112 .2666 .4667 1.008 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-14-83
REF: JPL LOG 0913 DATE CODE 8223



DOSE, rads(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

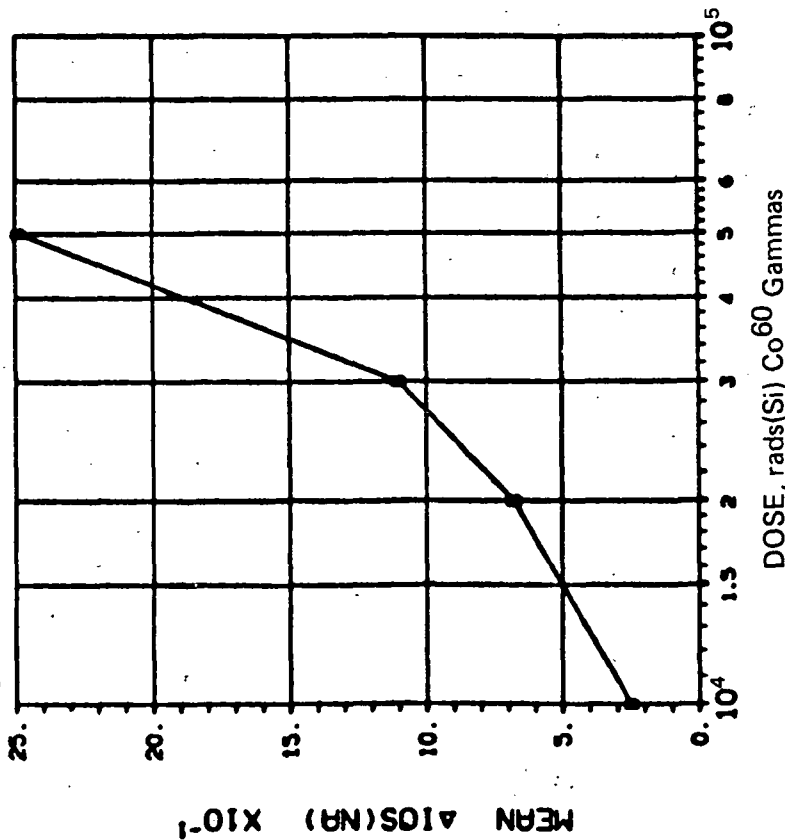
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 75 150 300 600 |
| | 1.980 31.45 14.94 ***** |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-15-83

REF: JPL LOG 0913 DATE CODE 8223



(2)ΔIOS(NA): VS DOSE

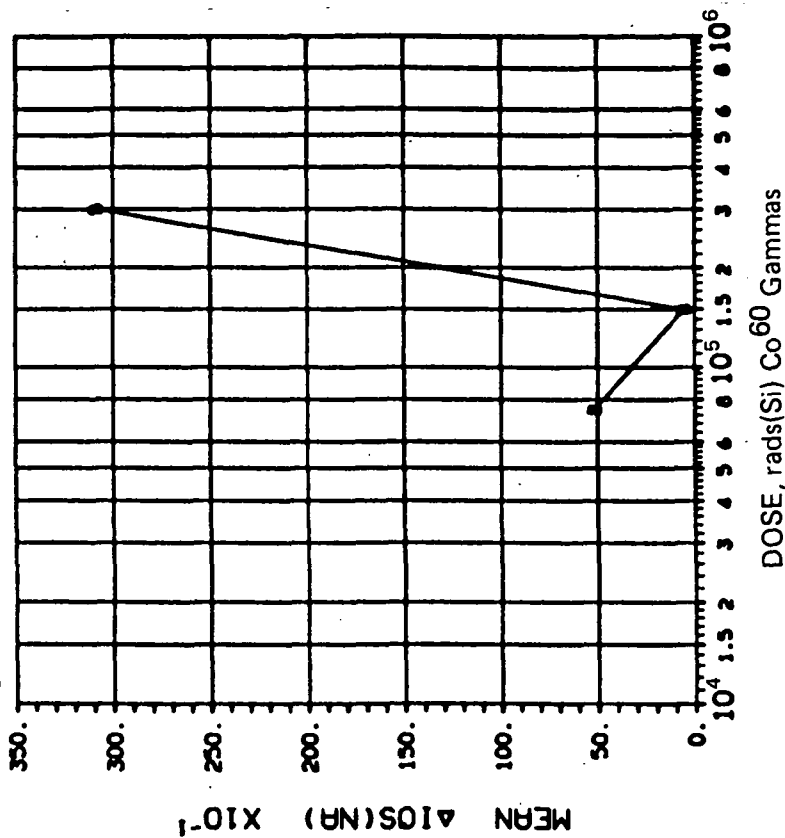
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| B | 10 20 30 50 |
| | .2041 .5162 .6491 1.594 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-14-83

REF: JPL LOG 0913 DATE CODE 8223

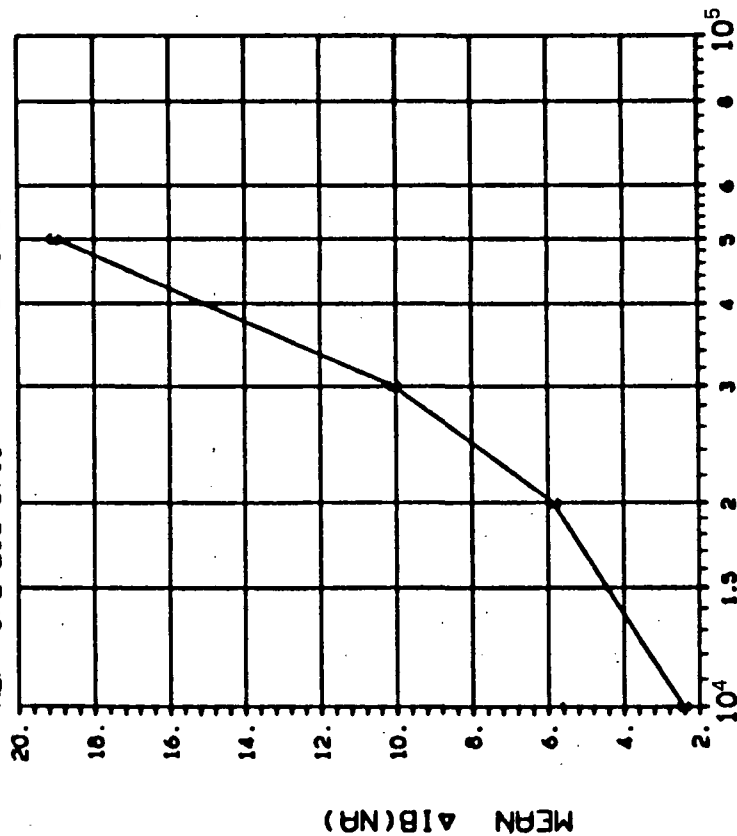


(2)ΔIOS(NA): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

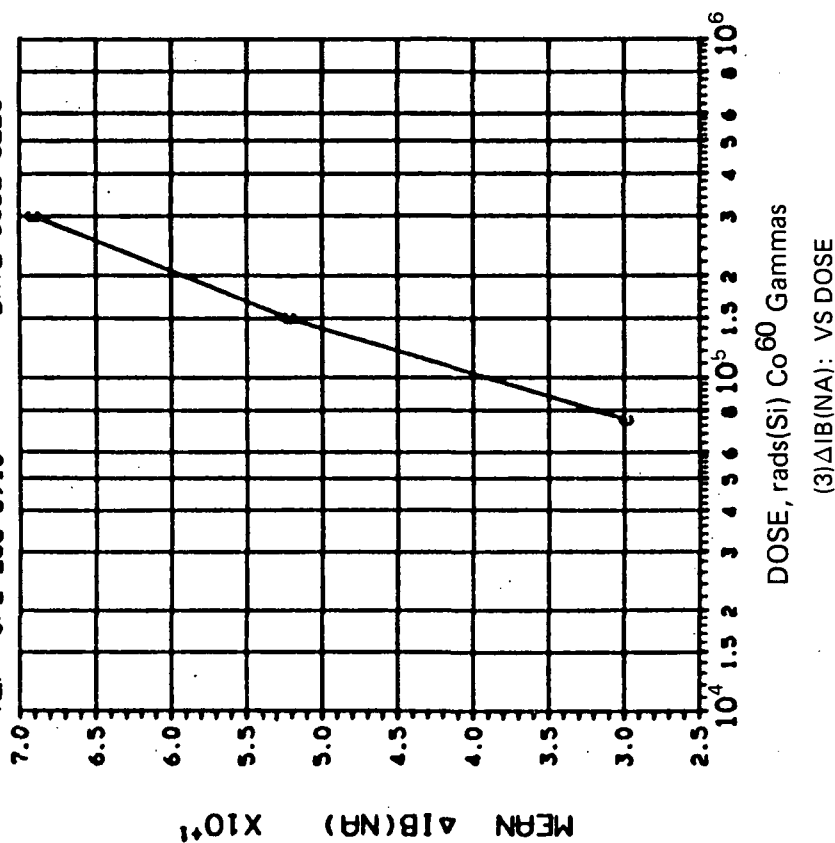
| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| B | 75 150 300 600 |
| | 2.928 38.35 10.53 ##### |

DEVICE TYPE: LM108 OP AMP
MFG: FSC 5 DEVICES TEST DATE 02-13-83
REF: JPL LOG 0913 DATE CODE 8223



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| | 10 20 30 50 |
| C | 1.239 2.579 4.055 7.281 |

DEVICE TYPE: LM108 OP AMP
MFG: FSC 5 DEVICES TEST DATE 02-14-83
REF: JPL LOG 0913 DATE CODE 8223

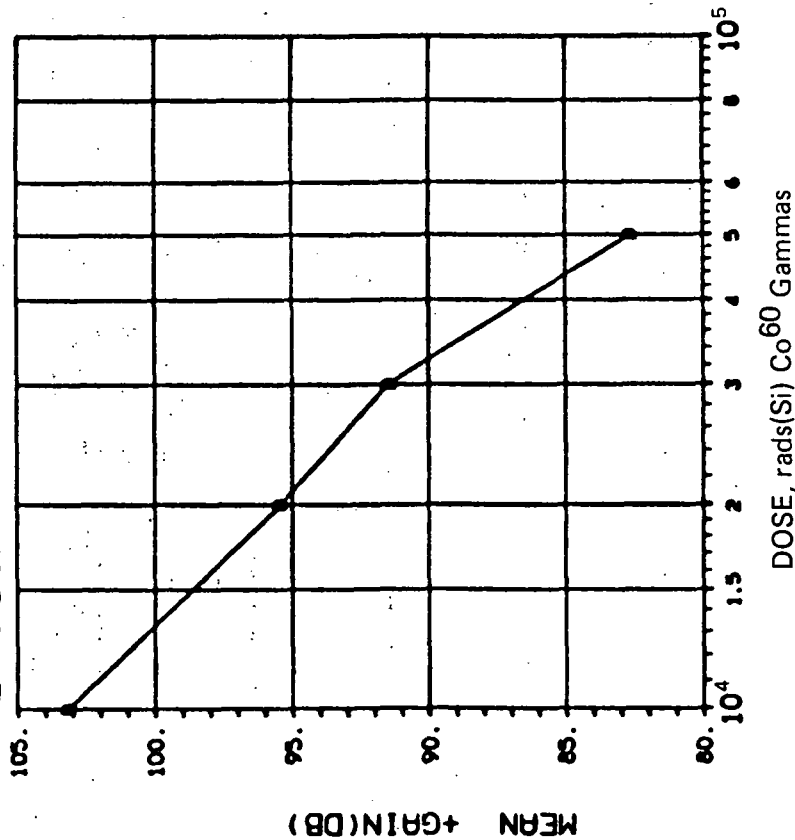


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| | 75 150 300 600 |
| C | 10.79 17.53 12.41 ##### |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-15-83

REF: JPL LOG 0913 DATE CODE 8223



(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

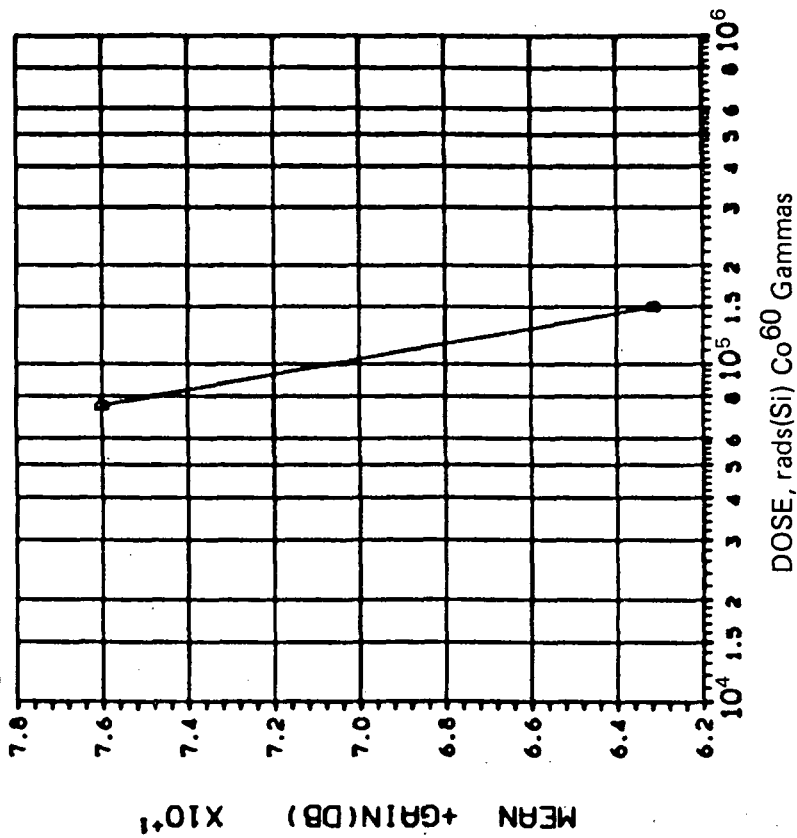
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 10 20 30 50 |
| | | 4.949 4.170 3.361 3.000 |

INITIAL MEAN VALUE +GAIN(DB) = $1.09 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-14-83

REF: JPL LOG 0913 DATE CODE 8223



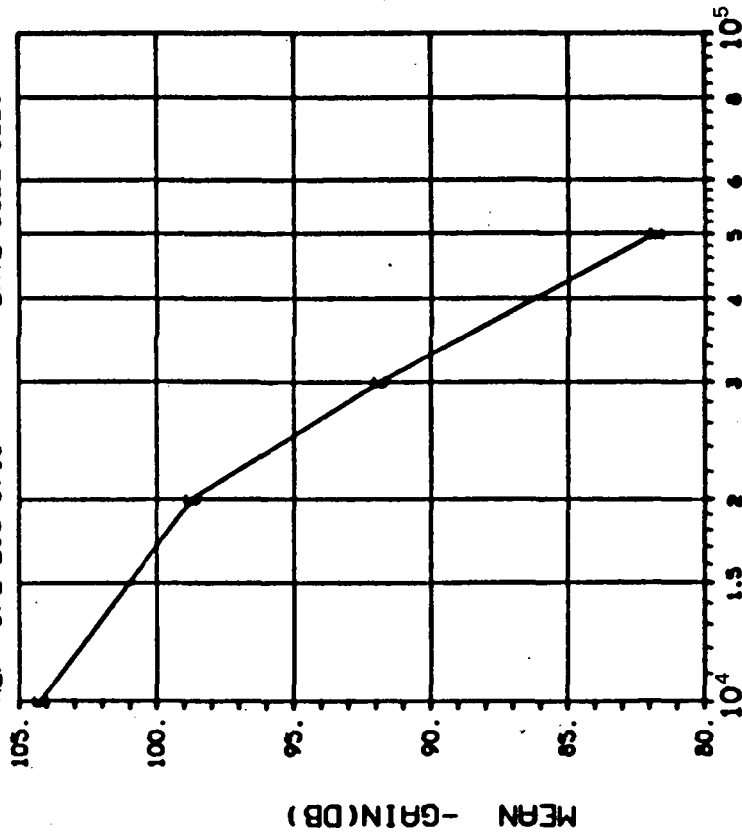
(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 600 |
| | | 3.048 4.395 ***** |

INITIAL MEAN VALUE +GAIN(DB) = $1.09 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: FSC TEST DATE 02-13-83
REF: JPL LOG 0913 DATE CODE 8223



DOSE, rads(Si) Co 60 Gammas

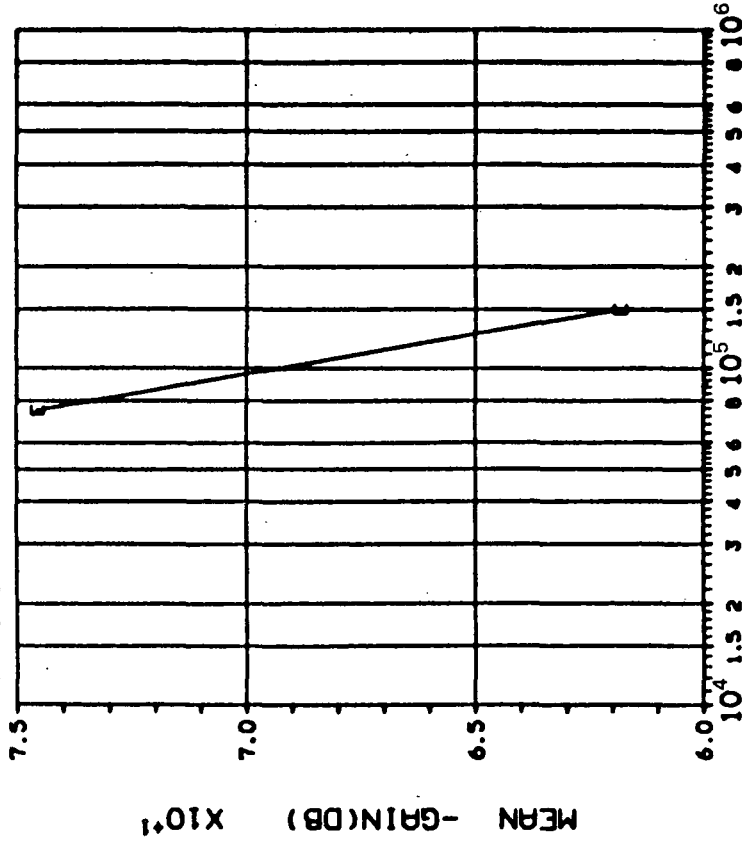
(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 5.317 3.420 3.262 2.767 |

INITIAL MEAN VALUE -GAIN(DB) = 1.11x10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: FSC TEST DATE 02-14-83
REF: JPL LOG 0913 DATE CODE 8223



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

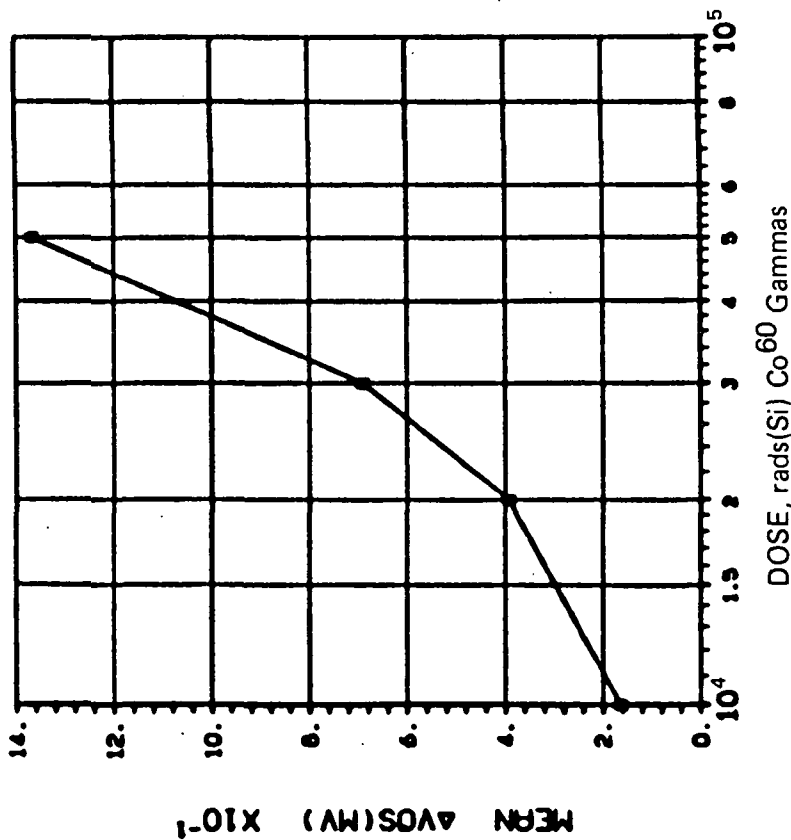
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 2.161 3.757 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 1.11x10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-15-83

REF: JPL LOG 0914-1 DATE CODE 8223



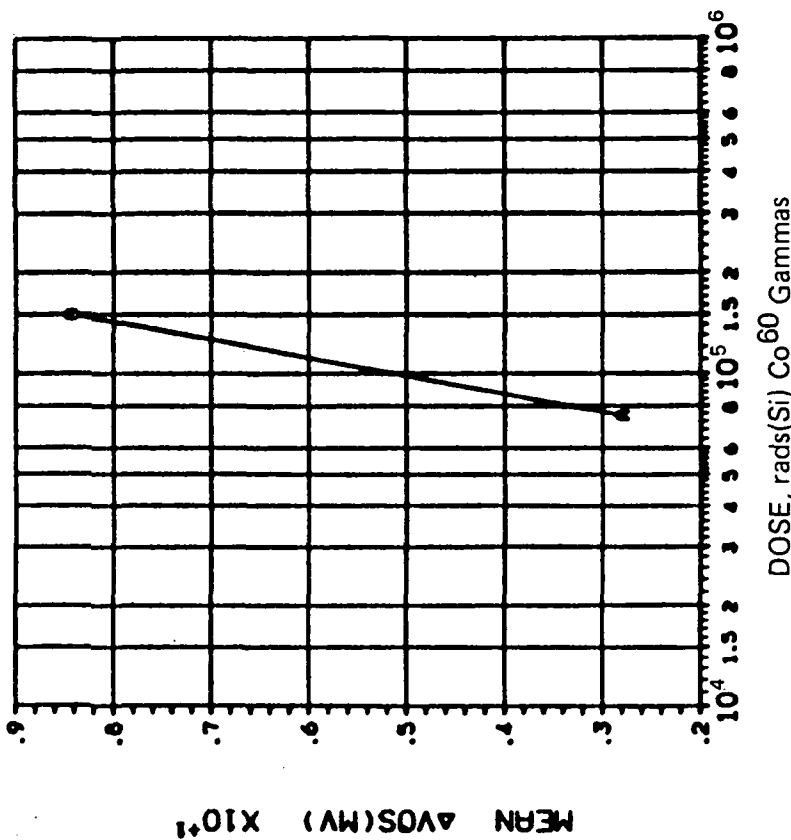
(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 20 30 50 |
| | .1295 .3129 .5484 1.080 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-14-83

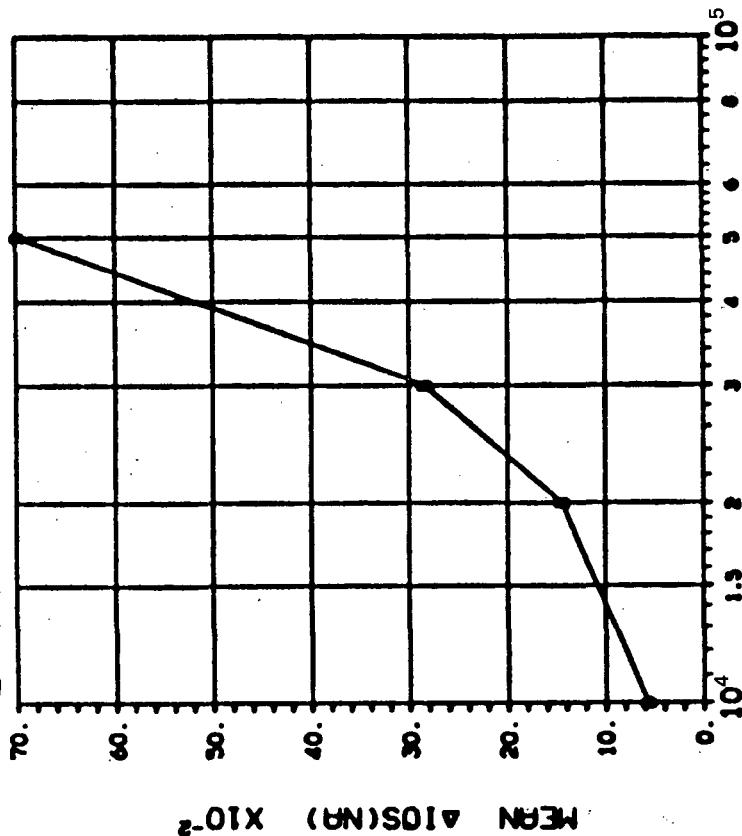
REF: JPL LOG 0914-2 DATE CODE 8223



(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 150 300 600 |
| | 2.083 5.943 ***** |

DEVICE TYPE: LM108 OP AMP
 MFG: FSC 5 DEVICES TEST DATE 02-15-83
 REF: JPL LOG 0914-1 DATE CODE 8223

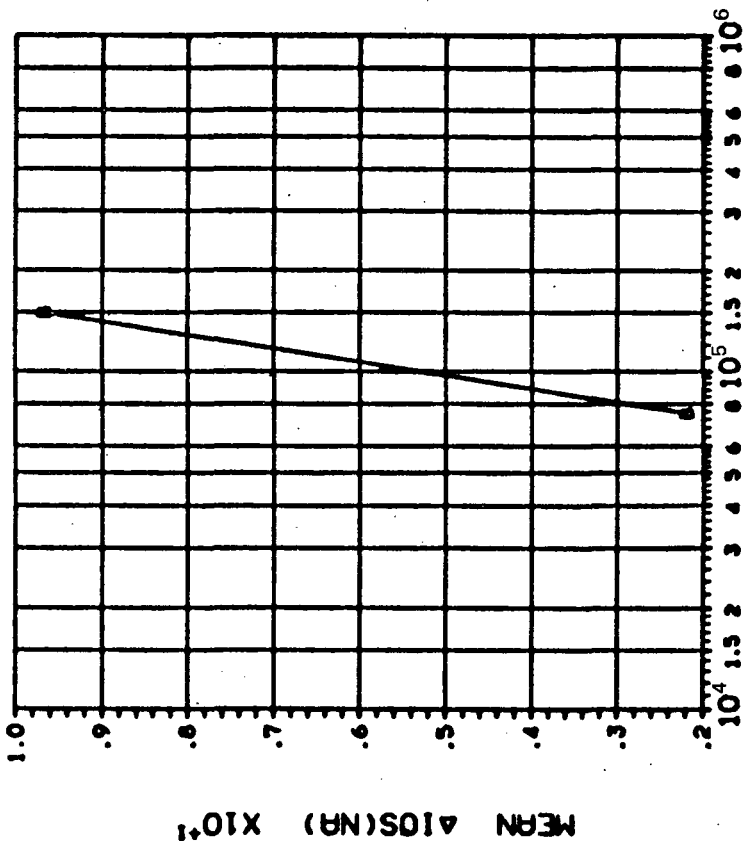


DOSE, rads(Si) Co 60 Gammas

(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 20 30 50 |
| | .1596 .3096 .5213 1.233 |

DEVICE TYPE: LM108 OP AMP
 MFG: FSC 5 DEVICES TEST DATE 02-14-83
 REF: JPL LOG 0914-2 DATE CODE 8223



DOSE, rads(Si) Co 60 Gammas

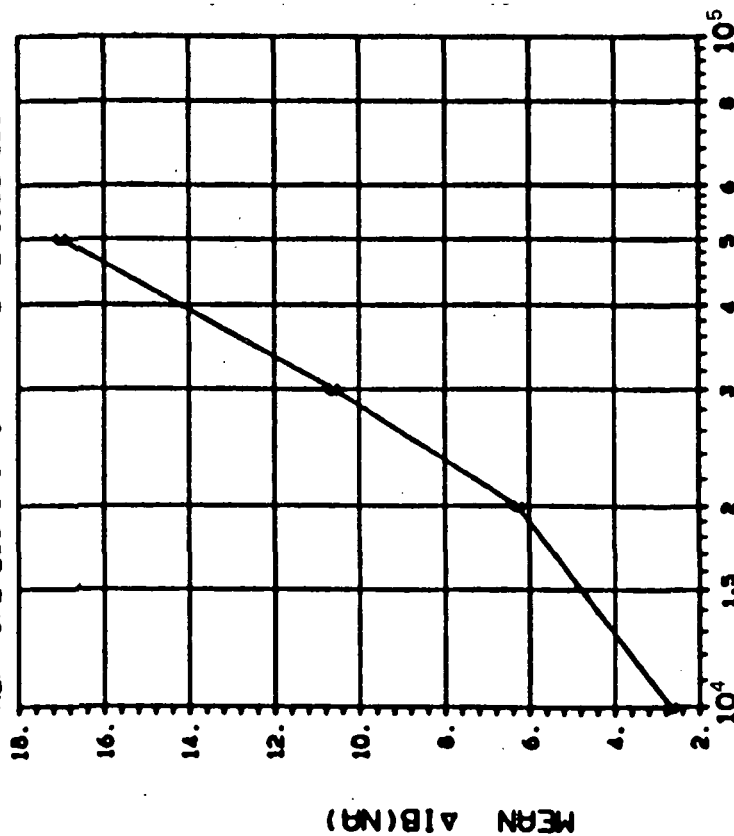
(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 150 300 600 |
| | 2.363 7.465 ***** |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-15-83

REF: JPL LOG 0914-1 DATE CODE 8223



DOSE, rads(Si) Co 60 Gammas

(3)ΔIB(NA): VS DOSE

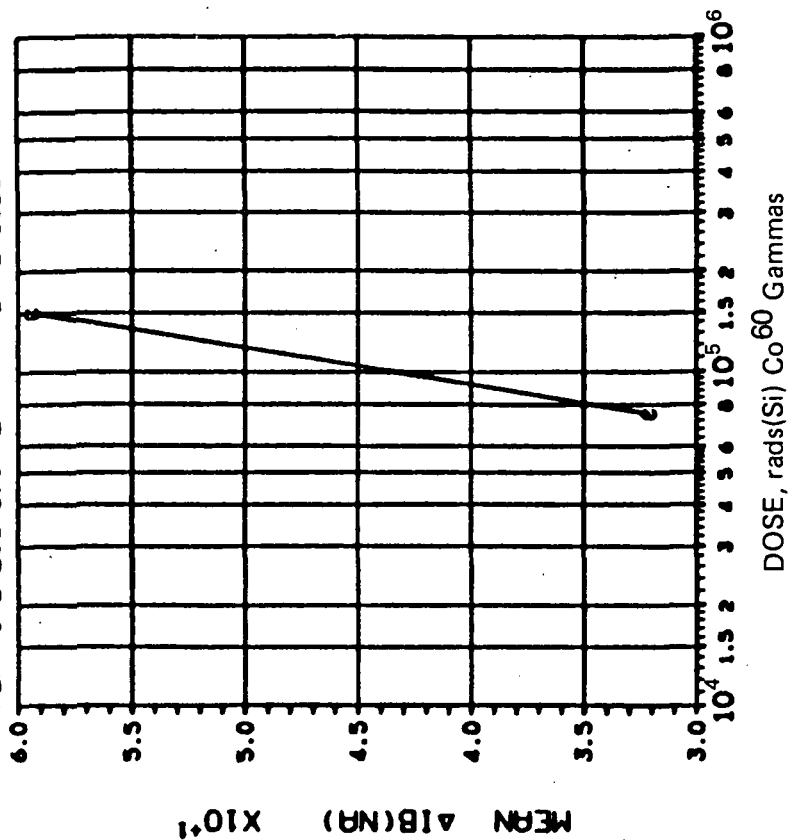
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------|
| | 10 | 20 | 30 | 50 |
| C | 1.329 | 3.092 | 5.149 | 6.484 |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-14-83

REF: JPL LOG 0914-2 DATE CODE 8223



DOSE, rads(Si) Co 60 Gammas

(3)ΔIB(NA): VS DOSE

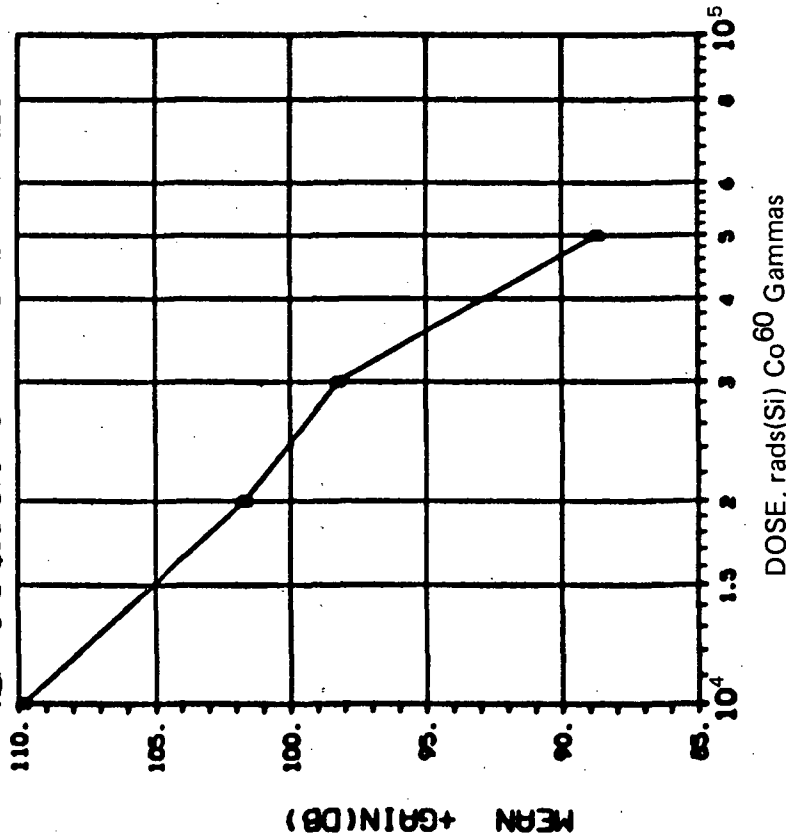
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------|
| | 75 | 150 | 300 | 600 |
| C | 14.05 | 21.77 | ***** | ***** |

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-15-83

REF: JPL LOG 0914-1 DATE CODE 8223



(4)+GAIN IN DB(1.MA LOAD.+10V): VS DOSE

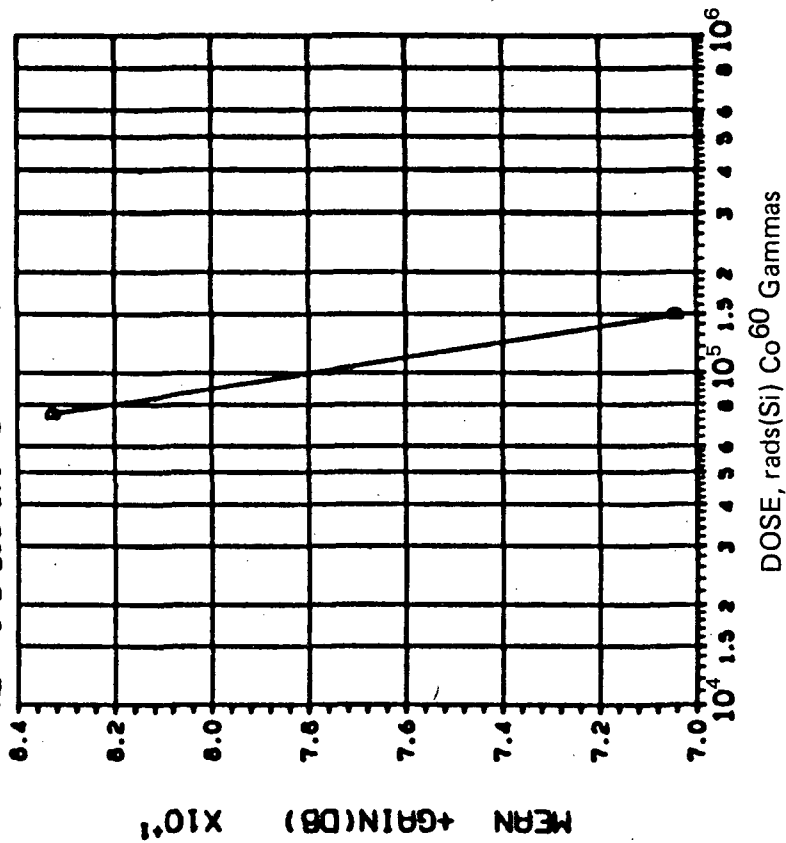
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 10 20 30 50 |
| | | 6.518 4.467 6.773 5.637 |

INITIAL MEAN VALUE +GAIN(DB) = $1.18 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: FSC 5 DEVICES TEST DATE 02-14-83

REF: JPL LOG 0914-2 DATE CODE 8223



(4)+GAIN IN DB(1.MA LOAD.+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 600 |
| | | 6.385 5.704 ##### |

INITIAL MEAN VALUE +GAIN(DB) = $1.18 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

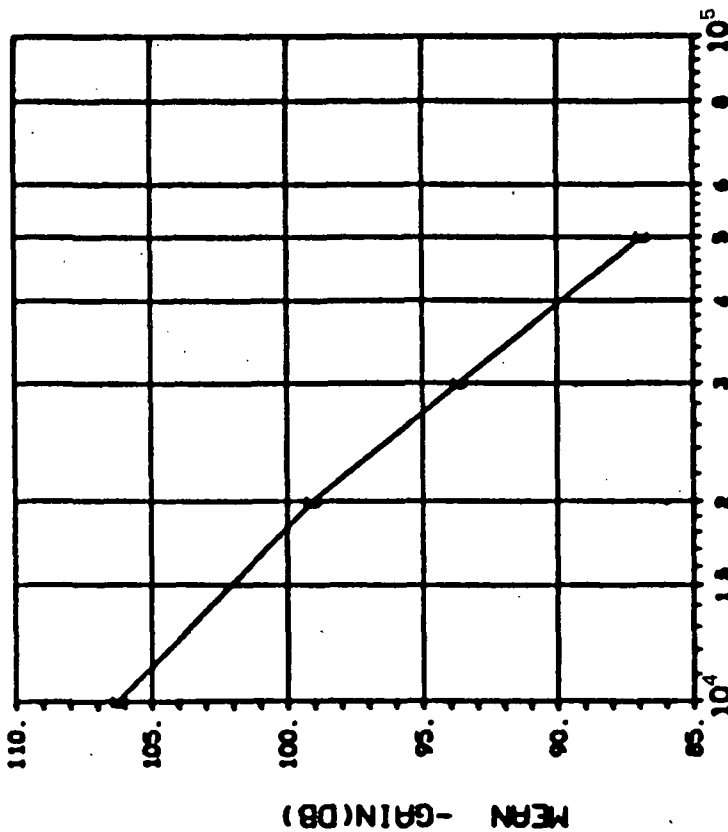
MFG: FSC

5 DEVICES

TEST DATE 02-15-83

REF: JPL LOG 0914-1

DATE CODE 8223



DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 2.162 3.374 3.954 5.734 |

INITIAL MEAN VALUE -GAIN(DB) = 1.16X10⁺²

DEVICE TYPE: LM108 OP AMP

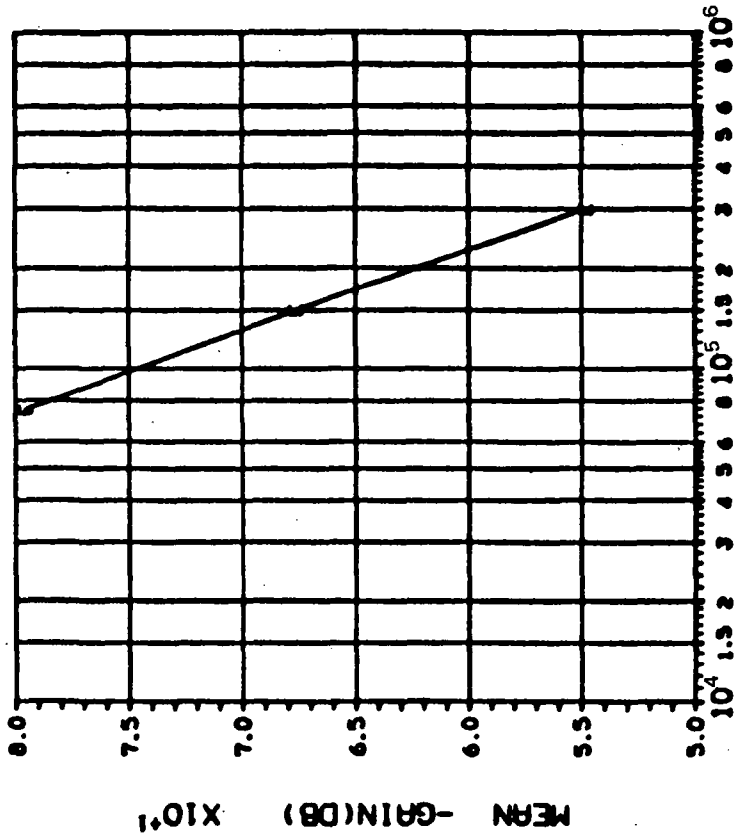
MFG: FSC

5 DEVICES

TEST DATE 02-14-83

REF: JPL LOG 0914-2

DATE CODE 8223



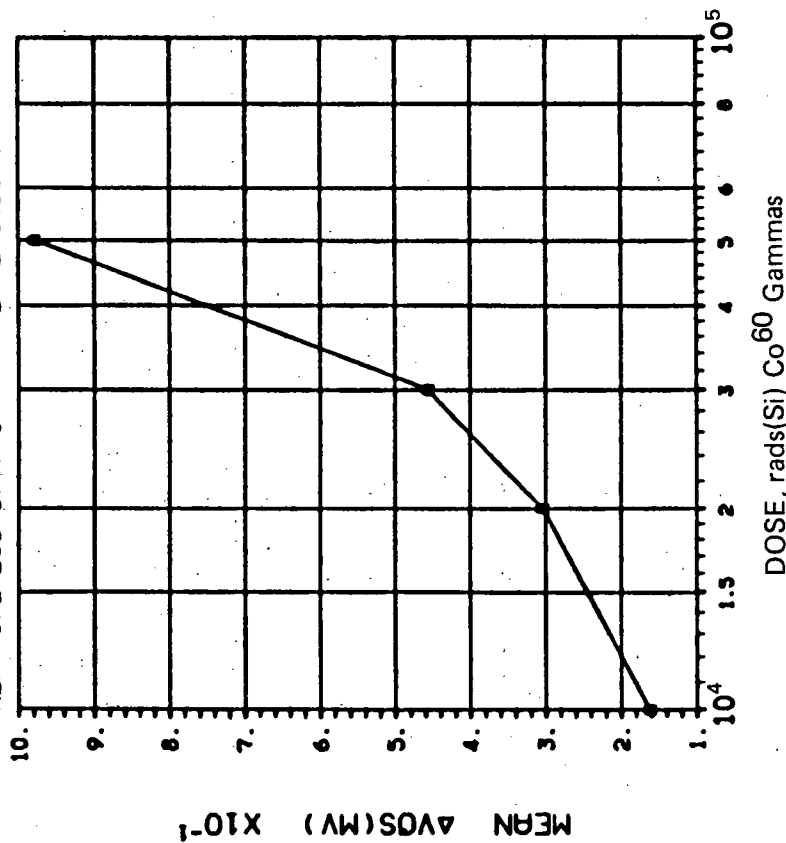
DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 |
| | | 5.656 6.618 7.538 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 1.16X10⁺²

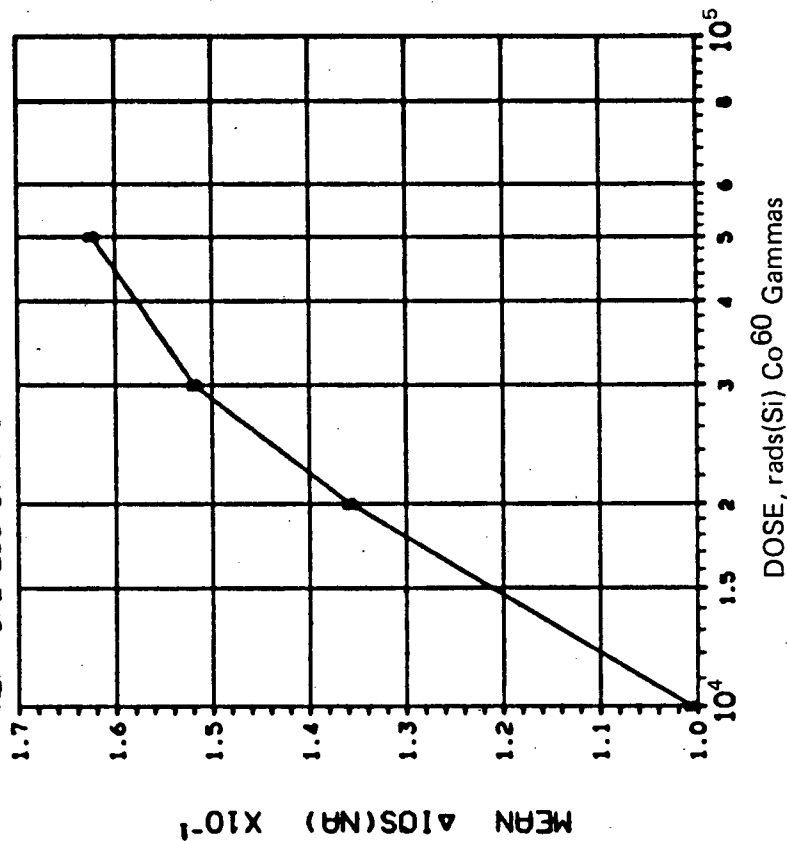
DEVICE TYPE: LM108 OP AMP
MFG: MOT 5 DEVICES TEST DATE 02-24-83
REF: JPL LOG 0949-1 DATE CODE L8143



(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|---------------------|-------|-------|-------|
| CURVE | DOSE, kilorads (Si) | | | |
| | 10 | 20 | 30 | 50 |
| A | .1008 | .1862 | .2740 | .5734 |

DEVICE TYPE: LM108 OP AMP
MFG: MOT 5 DEVICES TEST DATE 02-24-83
REF: JPL LOG 0949-1 DATE CODE L8143



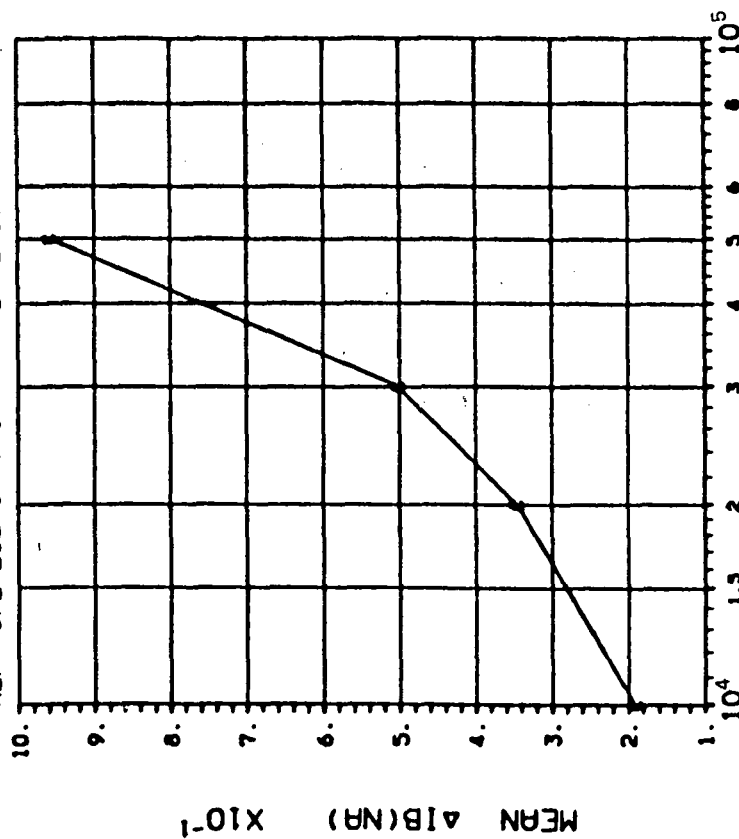
(2) ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| B | .0558 | .0743 | .0897 | .1092 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 02-24-83

REF: JPL LOG 0949-1 DATE CODE L8143



DOSE, rads(Si) Co 60 Gammas

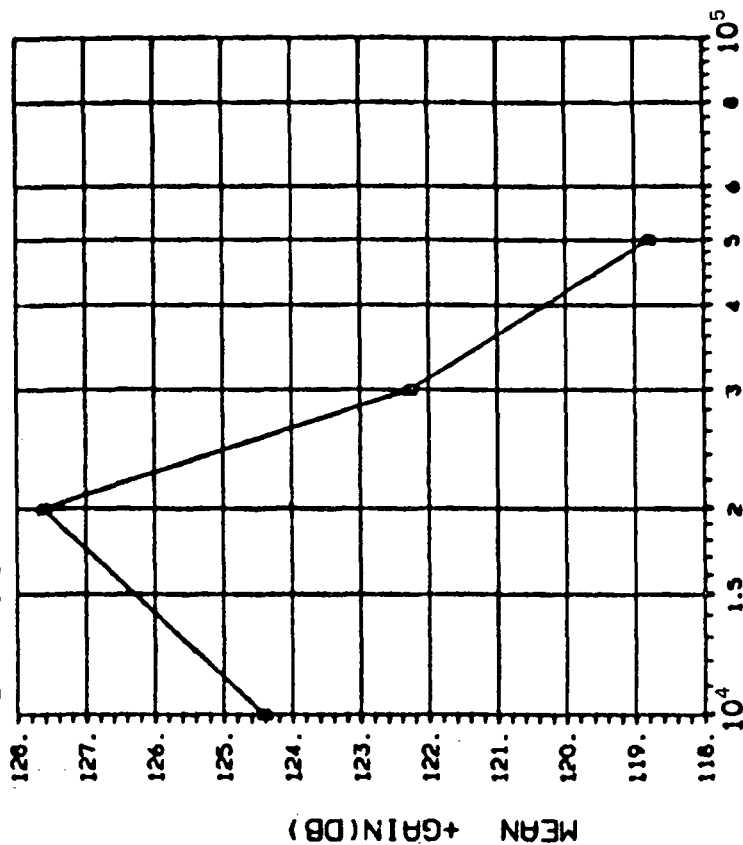
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| .1455 .2493 .3560 .7172 | |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 02-24-83

REF: JPL LOG 0949-1 DATE CODE L8143



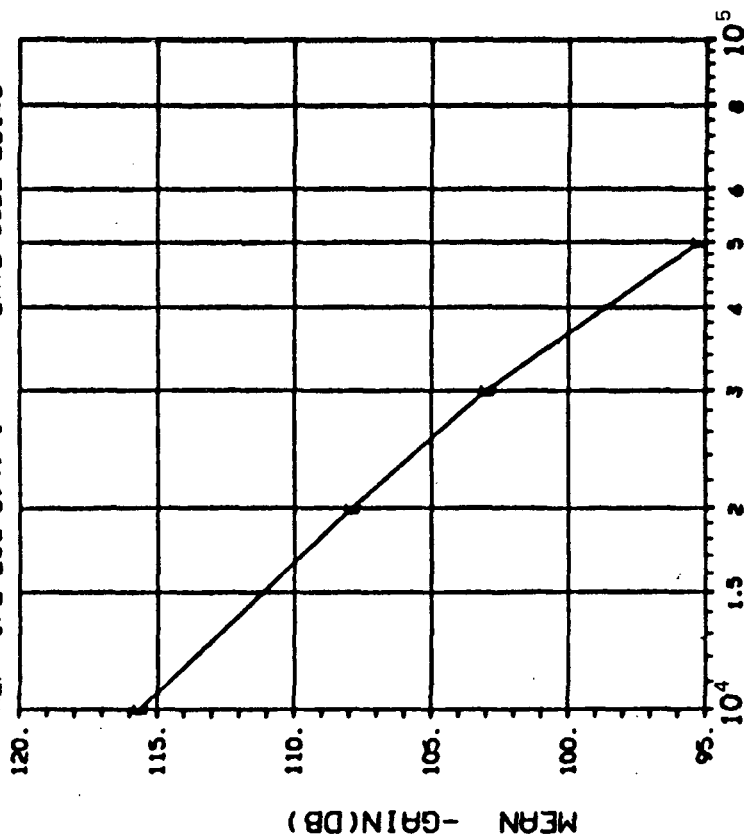
DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.1MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 10 |
| | 20 |
| | 30 |
| 1.00 11.06 11.87 8.525 5.037 | |

INITIAL MEAN VALUE +GAIN(DB) = 1.22x10⁺²

DEVICE TYPE: LM108 OP AMP
 MFG: MOT 5 DEVICES TEST DATE 02-24-83
 REF: JPL LOG 0949-1 DATE CODE L8143



DOSE, rads(Si) Co 60 Gammas
 (5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 8.056 6.679 6.171 8.507 |

INITIAL MEAN VALUE -GAIN(DB) = 1.25×10^{-2}

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 02-25-83

REF: JPL LOG 0950-1 DATE CODE L8143



DOSE, rads(Si) Co⁶⁰ Gammas

(1)ΔVOS(MV): VS DOSE

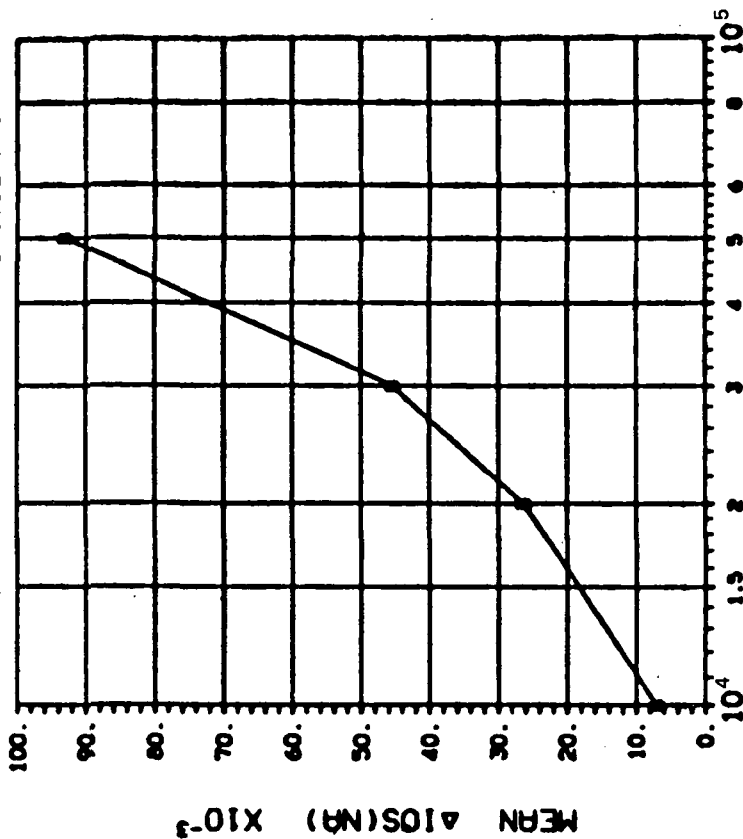
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | |
|-------|--------------------|-------|-------|
| | 10 | 20 | 30 |
| A | .0620 | .1006 | .1340 |
| | | | .1654 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 02-25-83

REF: JPL LOG 0950-1 DATE CODE L8143



DOSE, rads(Si) Co⁶⁰ Gammas

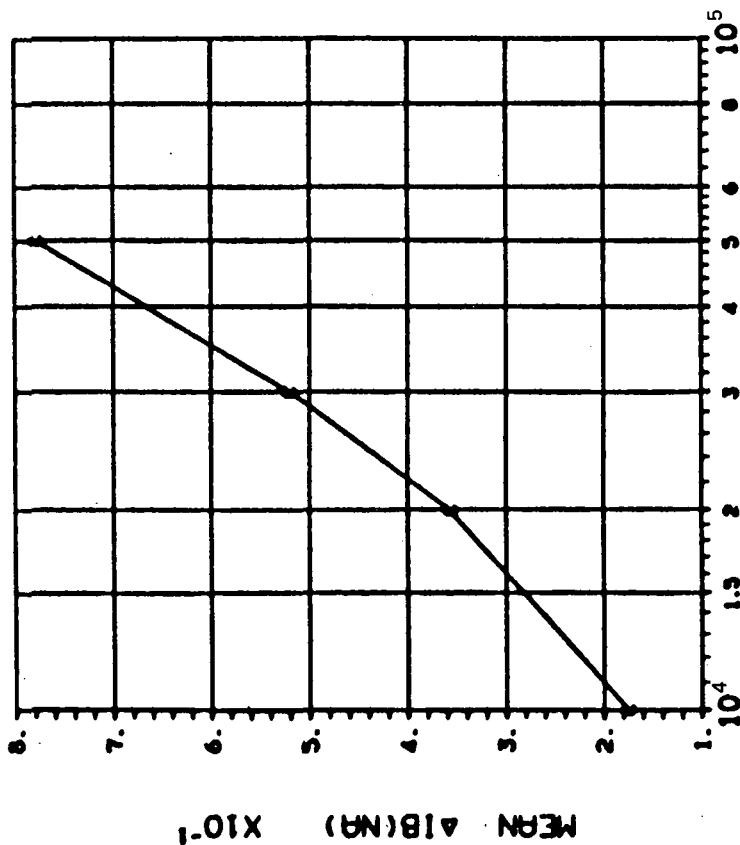
(2)ΔIOS(MA): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | |
|-------|--------------------|-------|-------|
| | 10 | 20 | 30 |
| B | .0965 | .1051 | .0961 |
| | | | .0976 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT TEST DATE 02-25-83
REF: JPL LOG 0950-1 DATE CODE L8143

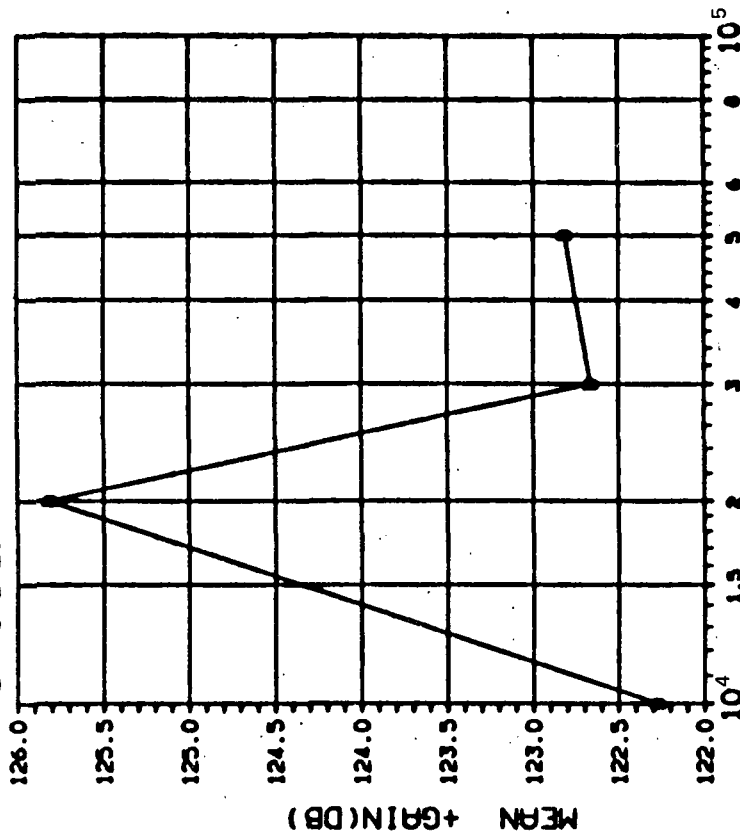


DOSE, rads(Si) Co 60 Gammas
(3) ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .1144 | .2183 .3241 .4625 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT TEST DATE 02-25-83
REF: JPL LOG 0950-1 DATE CODE L8143

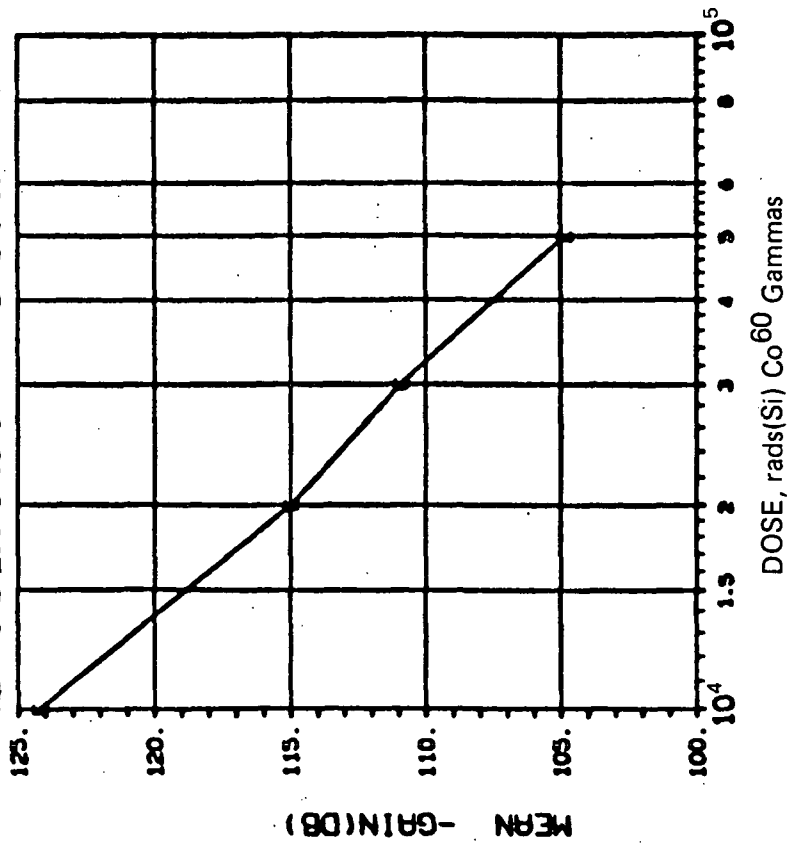


DOSE, rads(Si) Co 60 Gammas
(4) +GAIN IN DB(1.1MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | | |
| | | 10 | 20 | 30 | 50 |
| D | 1.00 | 9.171 | 13.40 | 7.678 | 9.694 |

INITIAL MEAN VALUE +GAIN(DB) = 1.22X10⁺²

DEVICE TYPE: LM108 OP AMP
 MFG: MOT 5 DEVICES TEST DATE 02-23-83
 REF: JPL LOG 0950-1 DATE CODE L8143



(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|-------------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 20 30 50 |
| | | 14.41 6.422 6.849 6.540 |

INITIAL MEAN VALUE -GAIN(DB) = $1.19 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

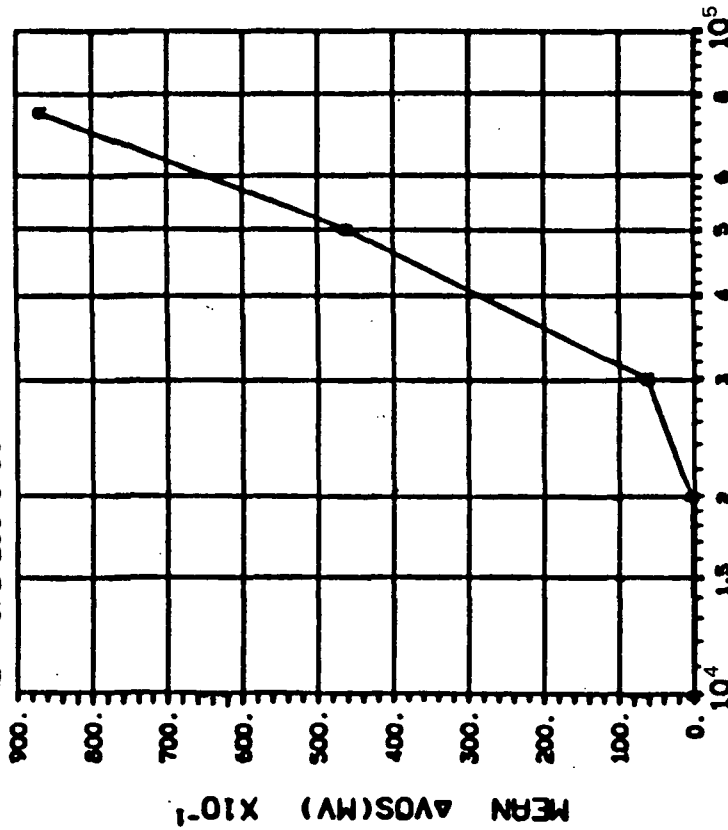
MFG: MOT

5 DEVICES

TEST DATE 01-19-83

REF: JPL LOG 0951

DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

(1)ΔVOS(MV): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------------|
| | 10 | 20 | 30 | 75 |
| A | .0555 | .1866 | 5.232 | 28.67 46.05 |

DEVICE TYPE: LM108 OP AMP

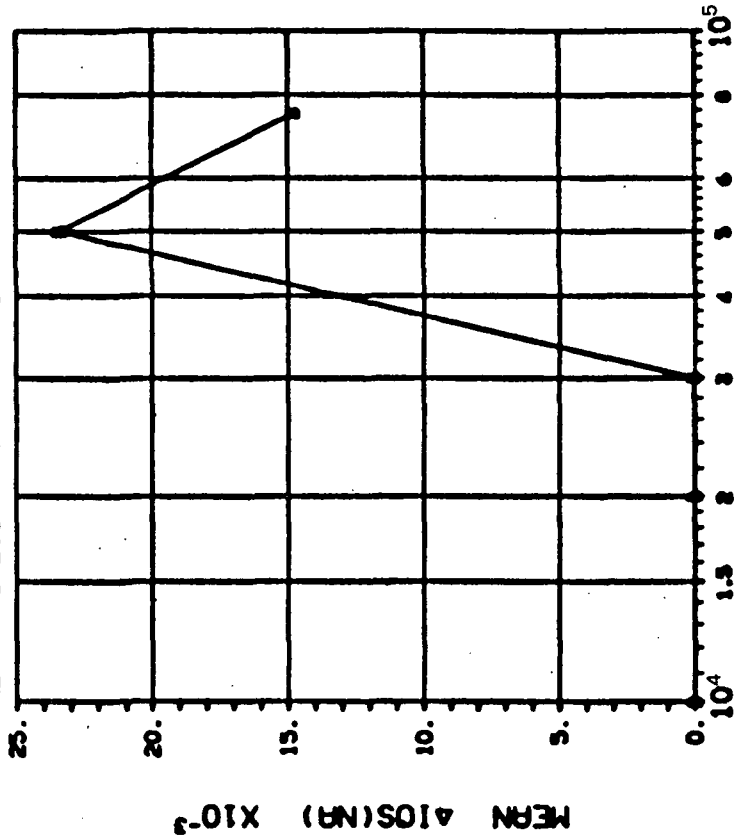
MFG: MOT

5 DEVICES

TEST DATE 01-19-83

REF: JPL LOG 0951

DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(NA): VS DOSE

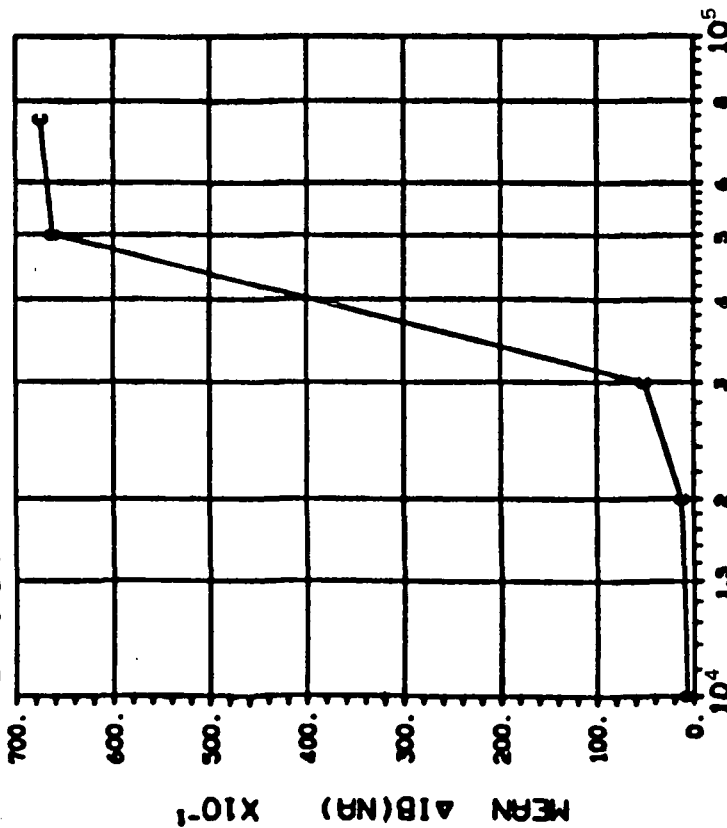
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------------|
| | 10 | 20 | 30 | 50 75 |
| B | .0369 | .0613 | .2622 | 56.74 26.61 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-19-83

REF: JPL LOG 0931 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

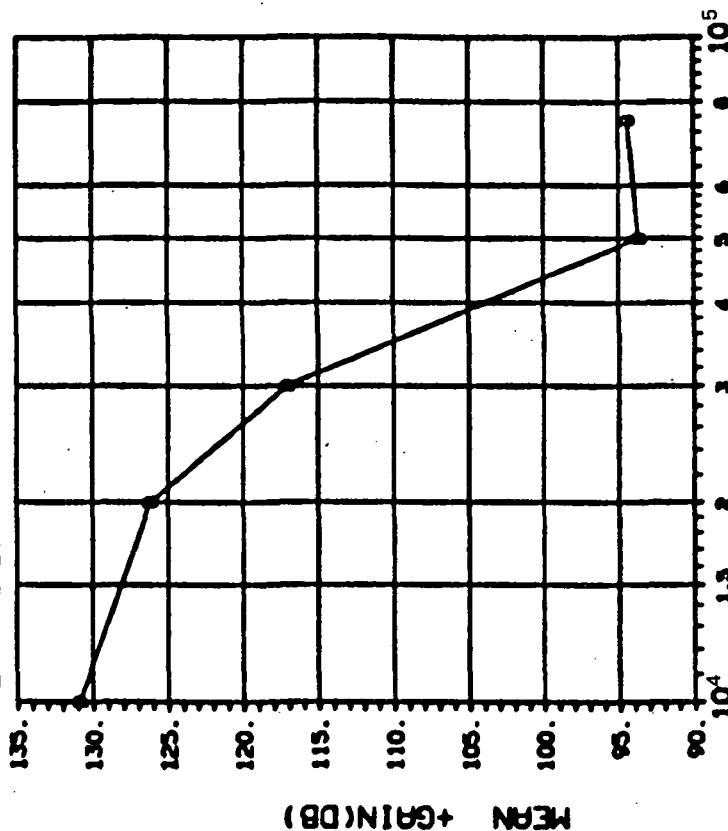
(3) ΔIB (NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|---------------------|--------------------|--------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| C | 1.00 | 10 | 0.3068 |
| | | 20 | .6695 |
| | | 30 | 3.929 |
| | | 50 | 43.12 |
| | | 75 | 40.76 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-19-83

REF: JPL LOG 0931 DATE CODE L8143



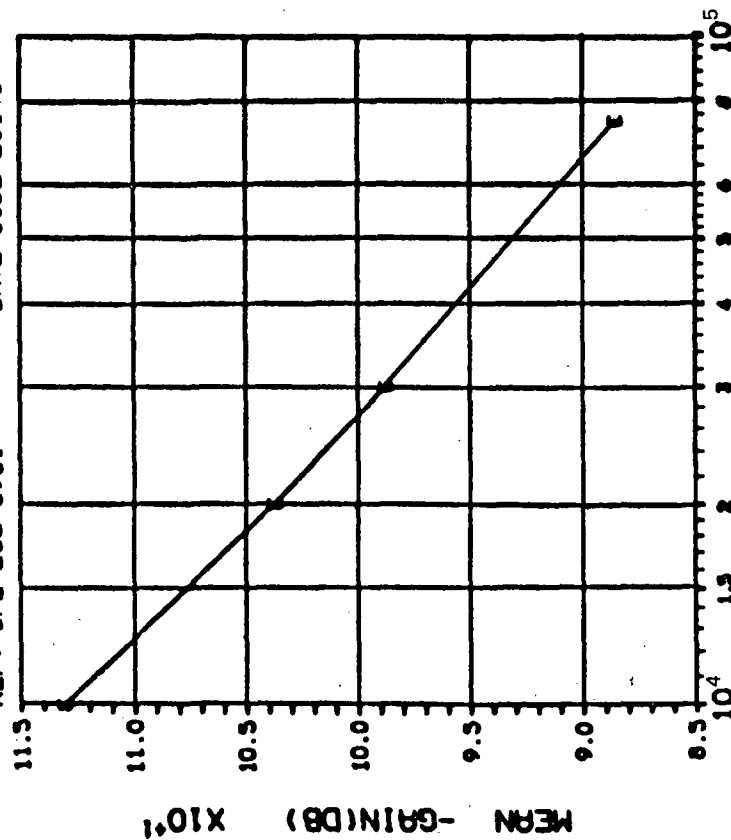
DOSE, rads(Si) 2.5 MeV electrons

(4) +GAIN IN DB(1.1MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|---------------------|--------------------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| D | 1.00 | 10 | 3.019 |
| | | 20 | 9.342 |
| | | 30 | 13.90 |
| | | 50 | 8.430 |
| | | 75 | 9.740 |

INITIAL MEAN VALUE +GAIN(DB) = 1.32x10⁺²

DEVICE TYPE: LM108 OP AMP
 MFG: MOT 5 DEVICES TEST DATE 01-19-83
 REF: JPL LOG 0951 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

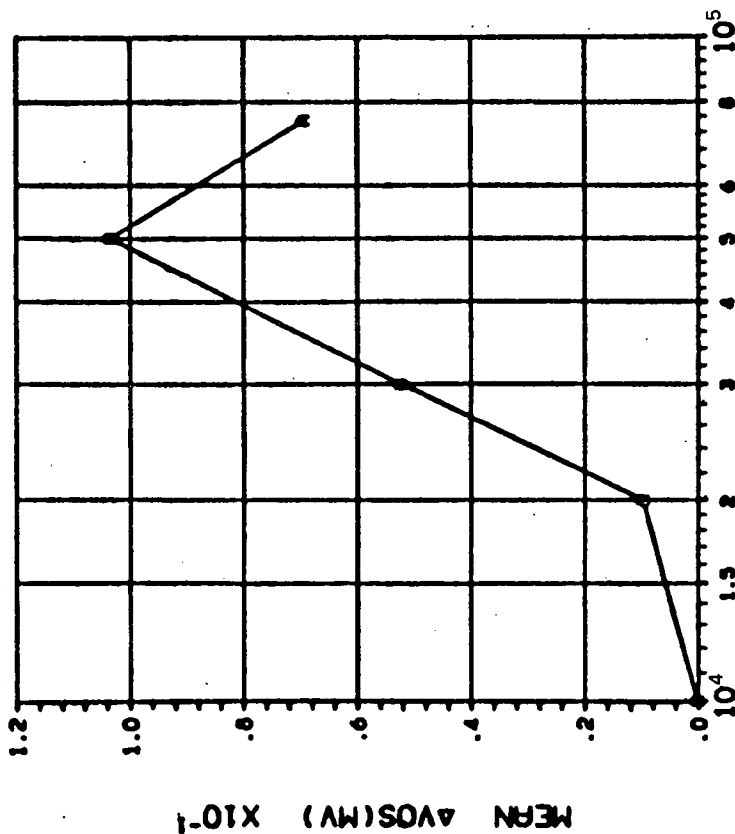
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| | | 10 | 30 | 50 |
| E | 1.00 | 4.616 | 4.744 | 9.213 |
| | | MIN | MIN | MIN |
| | | 7.223 | | |

INITIAL MEAN VALUE -GAIN(DB) = 1.21X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-21-83

REF: JPL LOG 0952 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

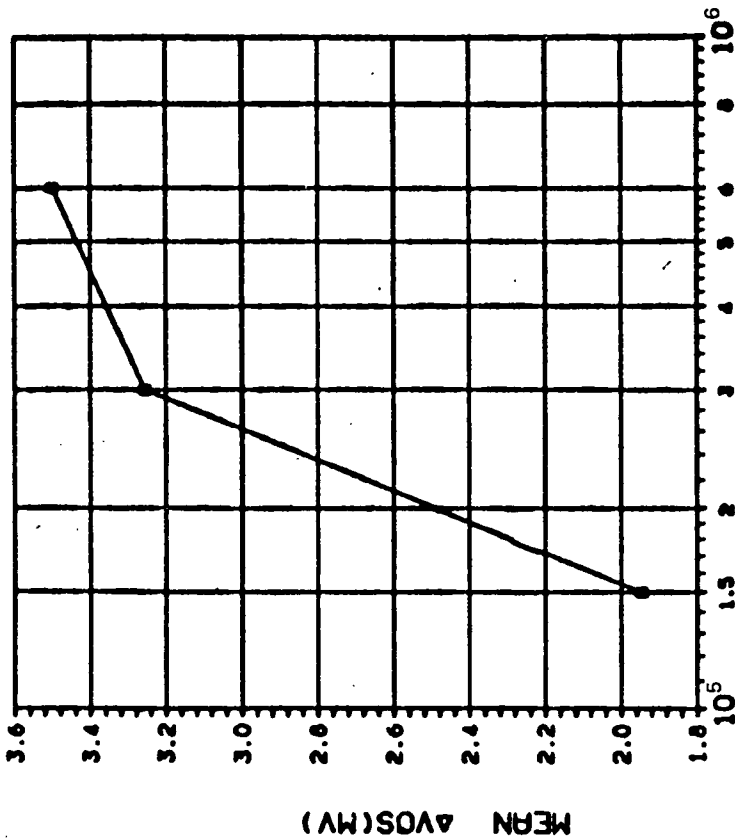
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 |
| | 20 |
| | 30 |
| | 50 |
| A | 75 |
| | 100 |
| | 150 |
| | 200 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-21-83

REF: JPL LOG 0952 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

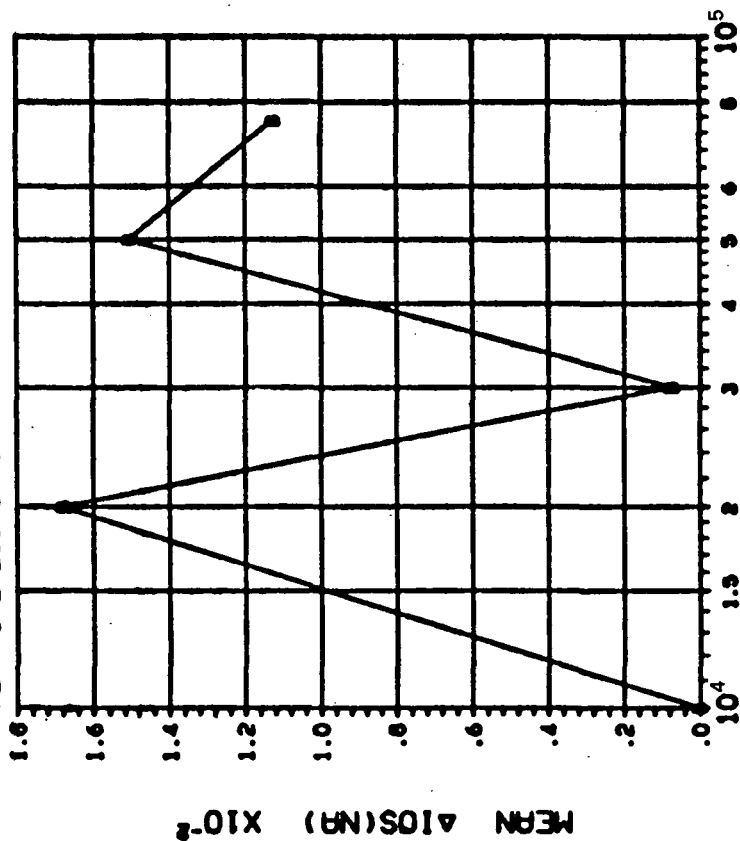
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 150 |
| | 300 |
| | 600 |
| | 1000 |
| A | 20.11 |
| | 7.582 |
| | 6.000 |
| | 1.000 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-21-83

REF: JPL LOG 0952 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

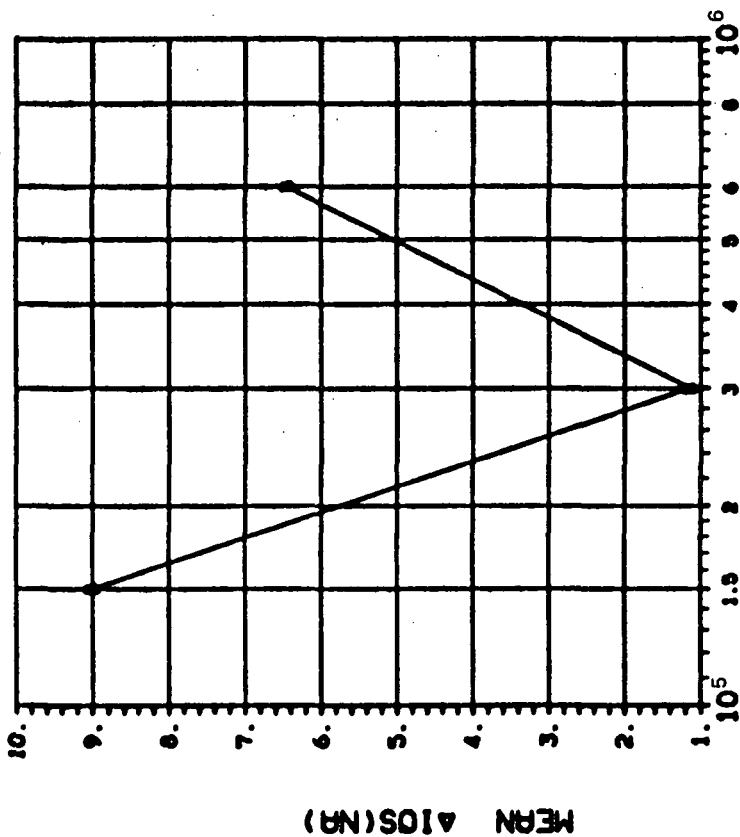
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 20 30 50 75 |
| | .0196 37.80 3.707 28.16 30.83 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-21-83

REF: JPL LOG 0952 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

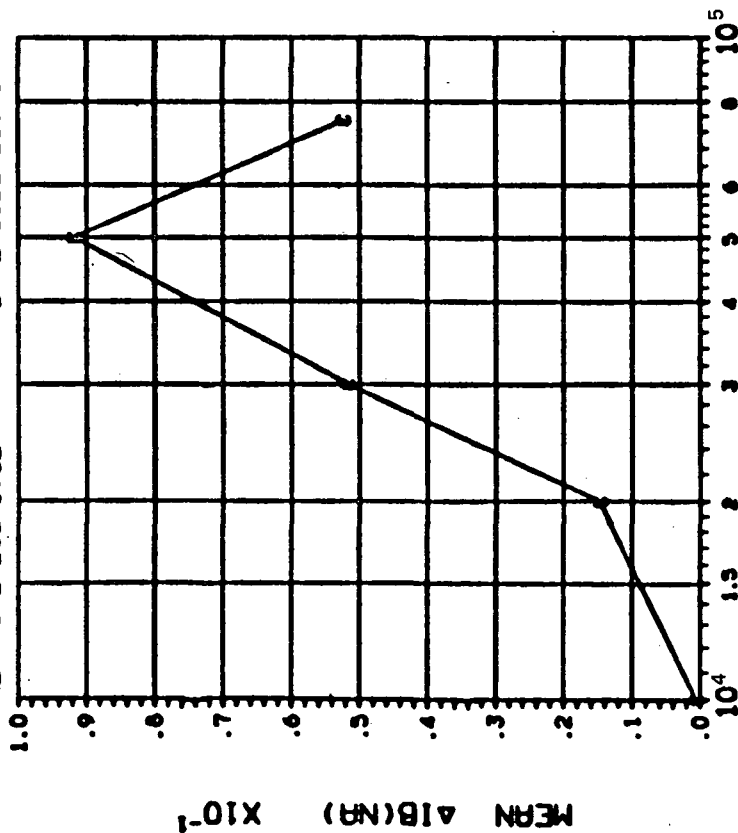
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 150 300 600 |
| | 29.31 6.027 5.186 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-21-83

REF: JPL LOG 0932 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

(3)ΔIB(NA): VS DOSE

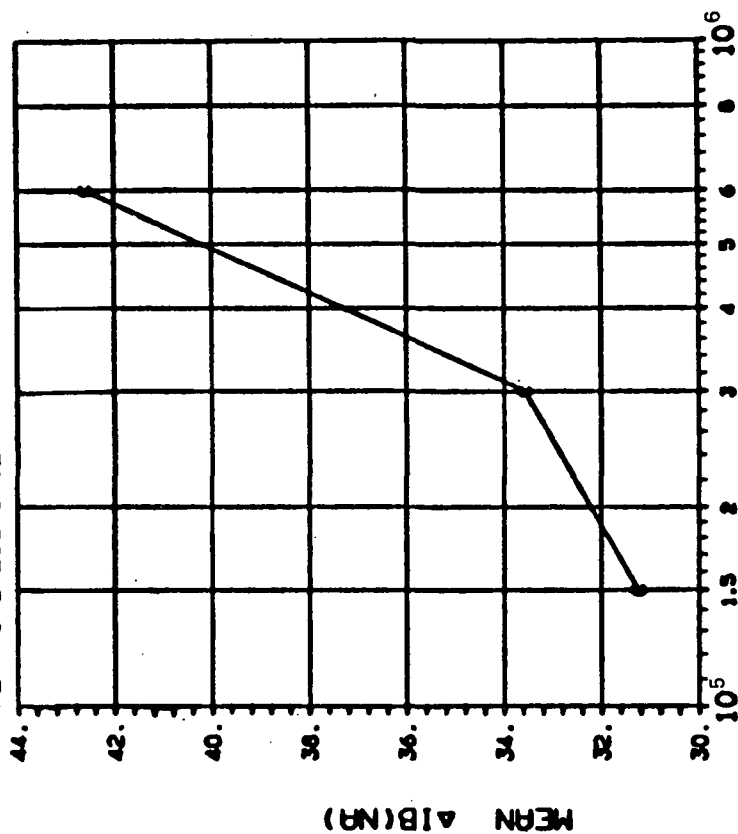
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | | | |
|-------|--------------------|-------|-------|-------|-------|
| | 10 | 20 | 30 | 50 | 75 |
| C | .2656 | 29.82 | 42.64 | 48.97 | 15.60 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 5 DEVICES TEST DATE 01-21-83

REF: JPL LOG 0932 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

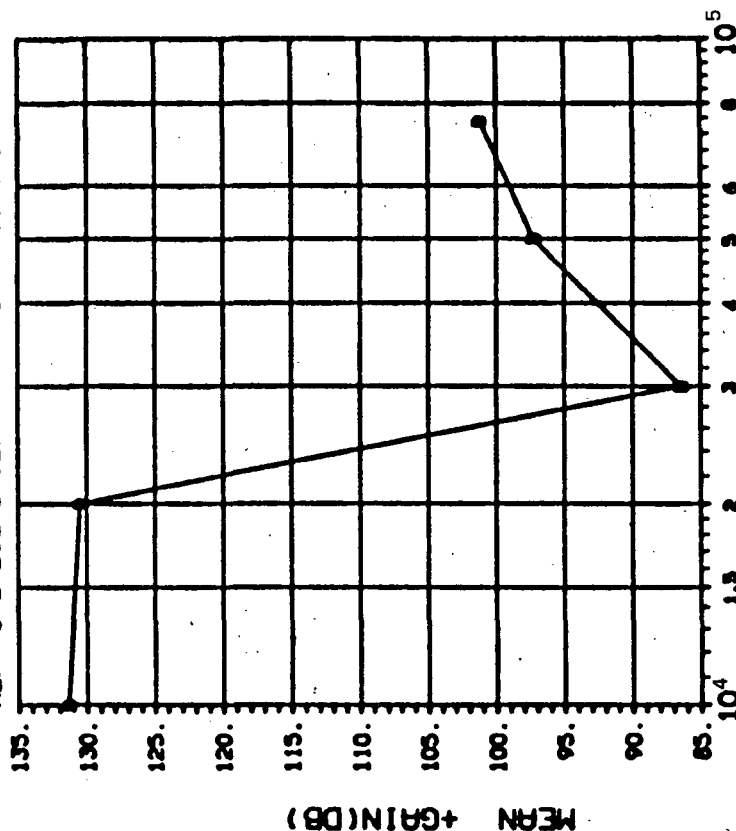
(3)ΔIB(NA): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) | | |
|-------|--------------------|-------|-------|
| | 150 | 300 | 600 |
| C | 14.37 | 8.638 | 15.67 |

DEVICE TYPE: LM108 OP AMP

MFG: MOT 3 DEVICES TEST DATE 01-21-83
REF: JPL LOG 0952 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons

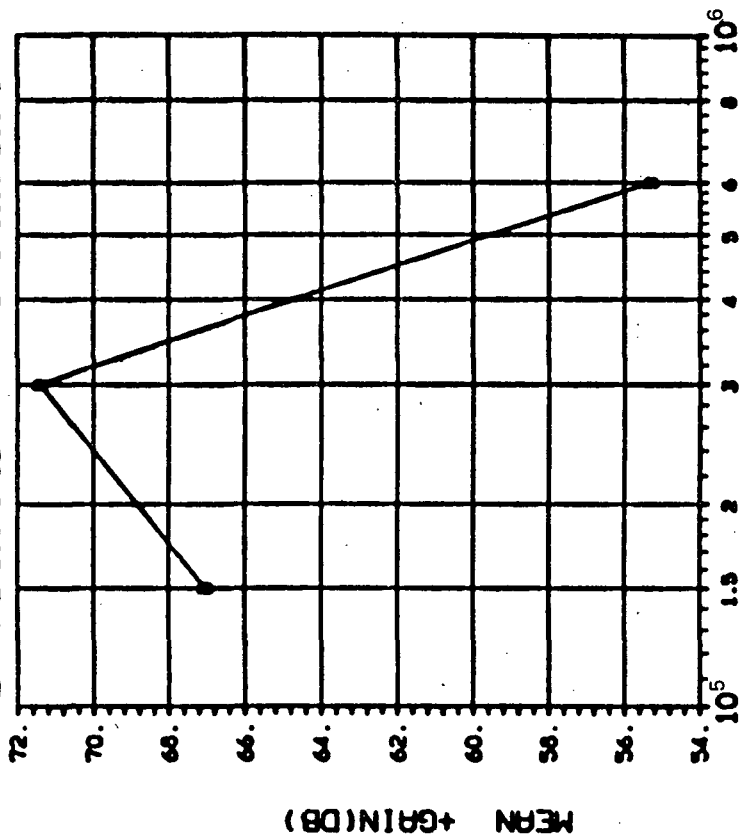
(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| D | 1.00 | 2.594 | 6.053 | 17.28 |
| | | 10 | 20 | 30 |
| | | 50 | 75 | |
| | | 12.85 | 6.239 | |

INITIAL MEAN VALUE +GAIN(DB) = 1.32X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: MOT 3 DEVICES TEST DATE 01-21-83
REF: JPL LOG 0952 DATE CODE L8143



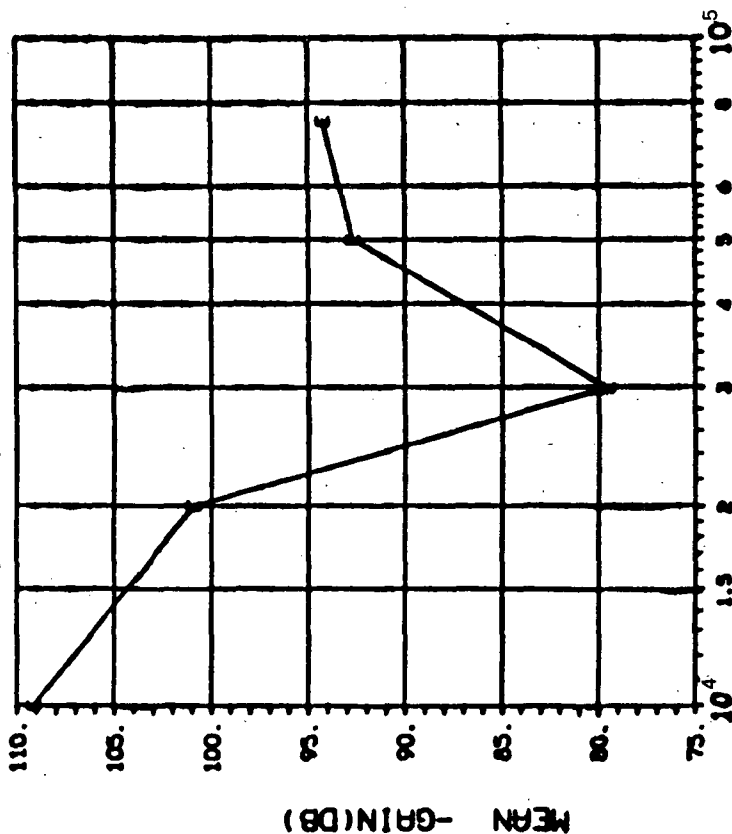
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| D | 1.00 | 7.667 | 6.803 | 6.980 |
| | | 150 | 300 | 600 |

INITIAL MEAN VALUE +GAIN(DB) = 1.32X10⁺²

DEVICE TYPE: LM108 OP AMP
 MFG: MOT 5 DEVICES TEST DATE 01-21-83
 REF: JPL LOG 0932 DATE CODE L8143



DOSE, rads(Si) 2.5 MeV electrons
 (S)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

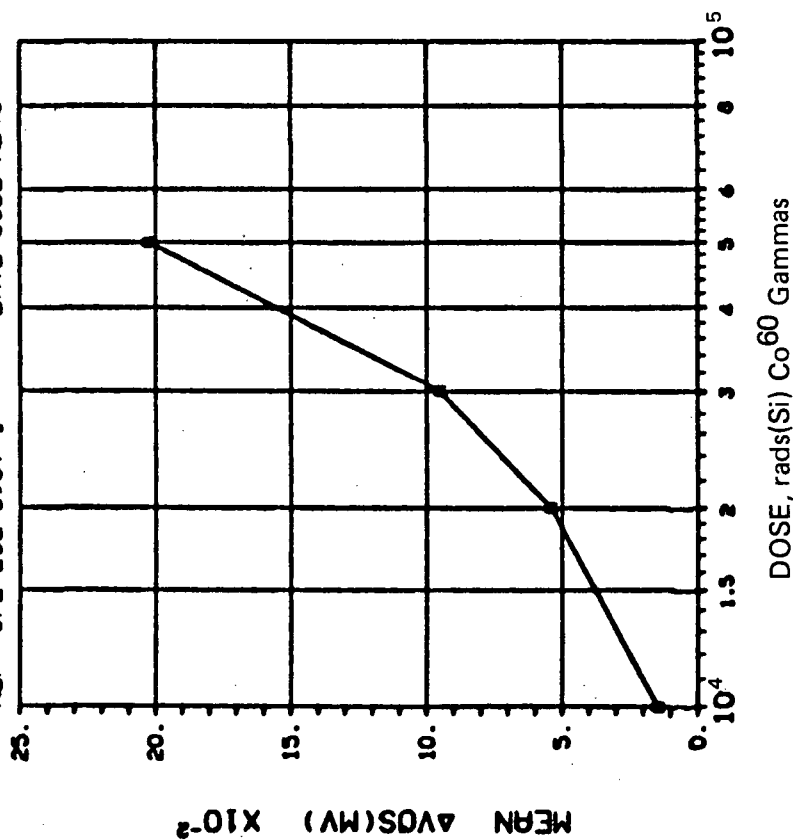
| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| | | 10 | 30 | 50 |
| E | 1.00 | 2.690 | 3.567 | 5.528 |
| | | 19.93 | 5.328 | 5.795 |

INITIAL MEAN VALUE -GAIN(DB) = 1.20x10¹²

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-9-82

REF: JPL LOG 0937-1 DATE CODE H240



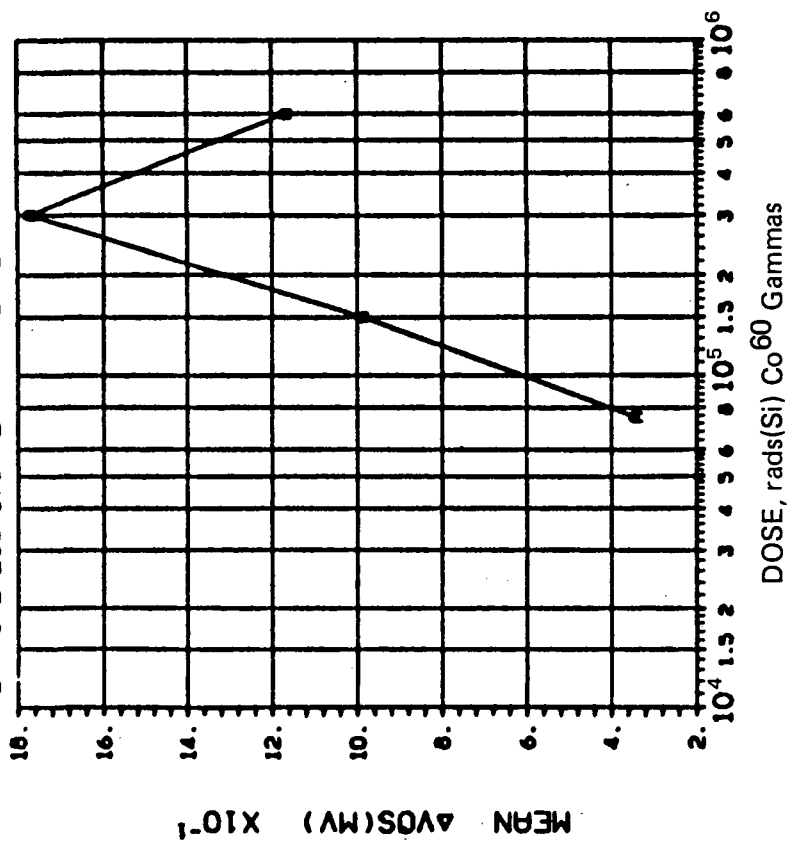
(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------|----------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0379 .0641 .1042 .1472 | |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-9-82

REF: JPL LOG 0937-2 DATE CODE H240



(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .2079 .4837 1.301 1.660 | |

DEVICE TYPE: LM108 OP AMP

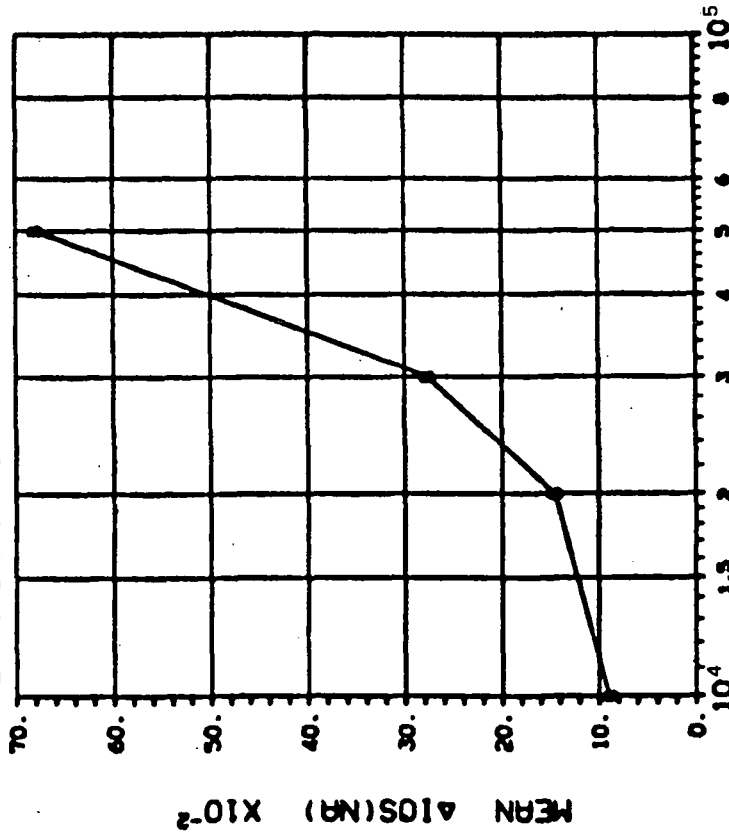
MFG: NSC

5 DEVICES

TEST DATE 12-9-82

REF: JPL LOG 0937-1

DATE CODE M240



DOSE, rad(Si) Co 60 Gammas

(2) Δ IOS(NA): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| B | 10 20 30 50 |
| | .0509 .0869 .1253 .2496 |

DEVICE TYPE: LM108 OP AMP

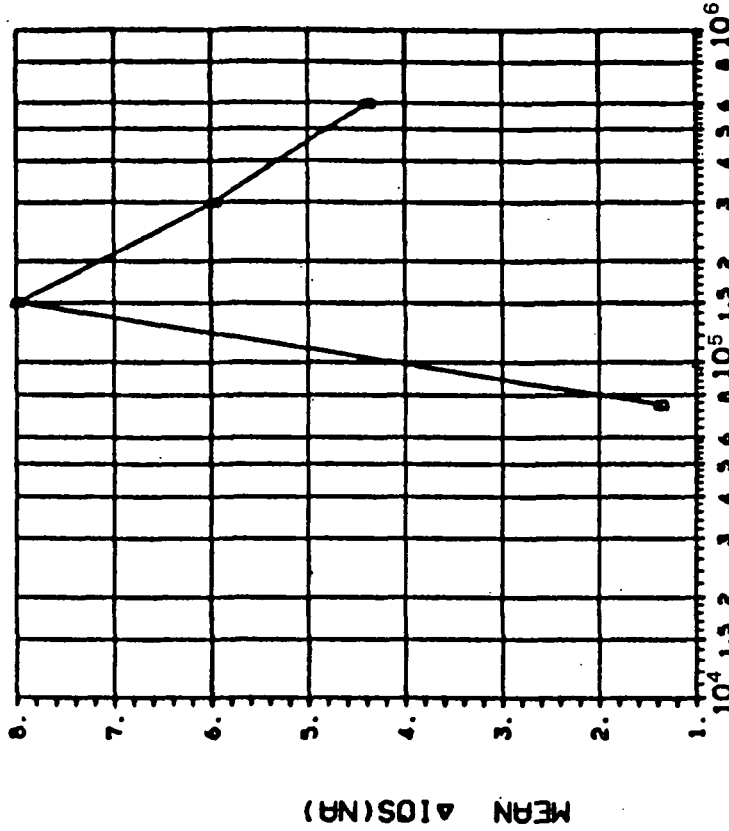
MFG: NSC

5 DEVICES

TEST DATE 12-9-82

REF: JPL LOG 0937-2

DATE CODE M240



DOSE, rad(Si) Co 60 Gammas

(2) Δ IOS(NA): VS DOSE

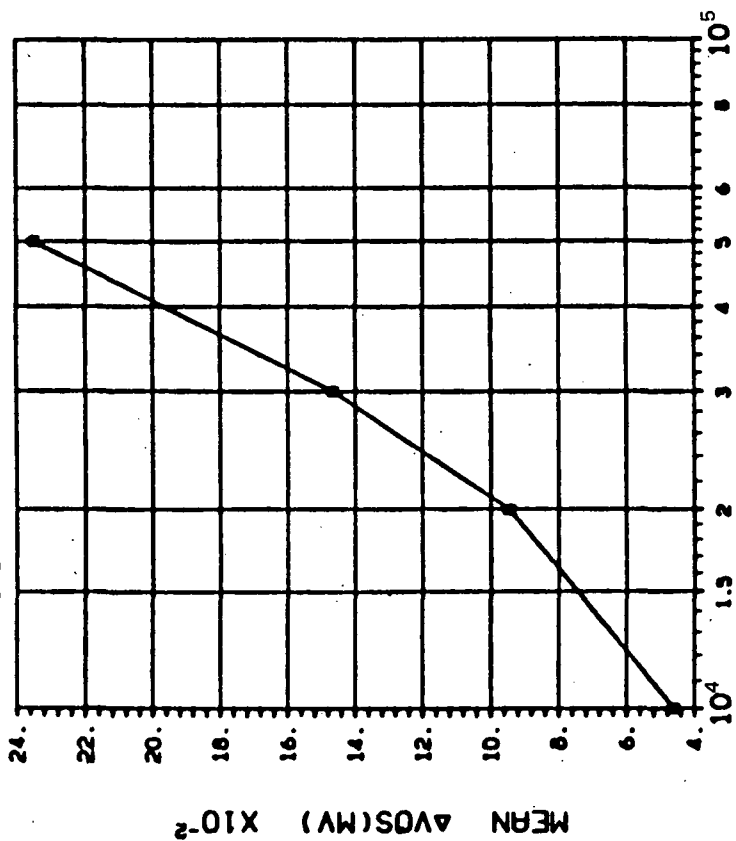
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| B | 75 150 300 600 |
| | .3822 6.349 1.534 4.044 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC TEST DATE 12-14-82

REF: JPL LOG 0938-1 DATE CODE H240



DOSE, rad(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

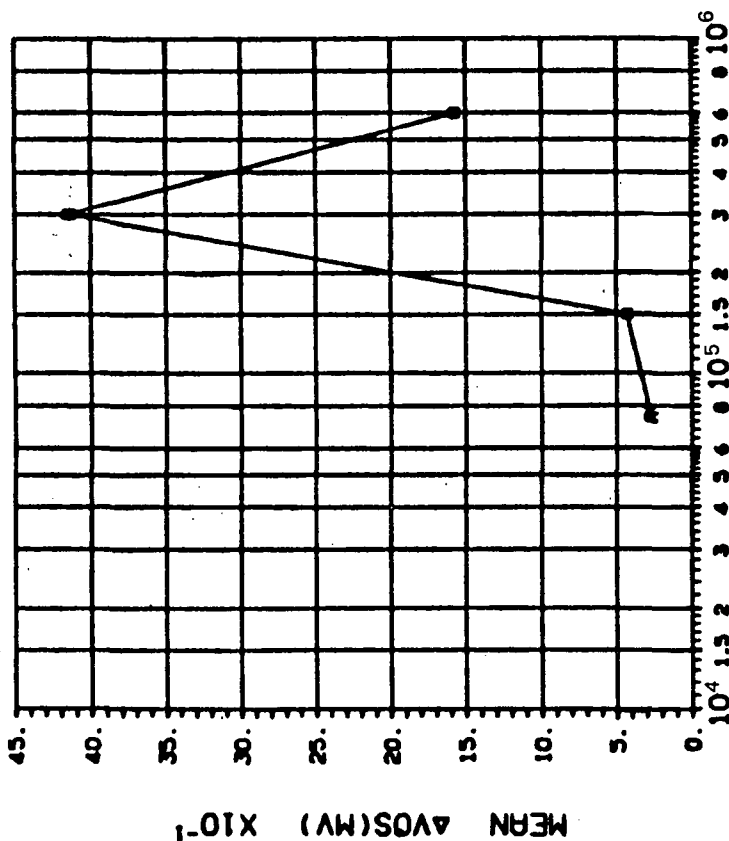
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 10 20 30 50 |
| | .0305 .0575 .0911 .3106 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC TEST DATE 12-13-82

REF: JPL LOG 0938-2 DATE CODE H240



DOSE, rad(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

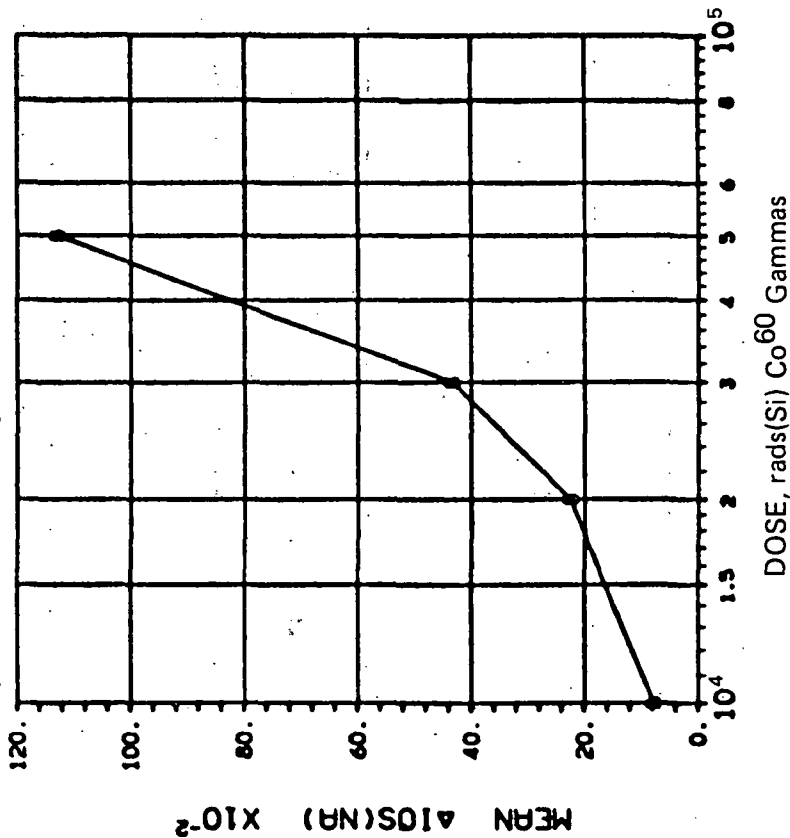
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| A | 75 150 300 600 |
| | .4754 .3331 2.498 2.011 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-14-82

REF: JPL LOG 0938-1 DATE CODE H240



DOSE, rad(Si) Co60 Gammas

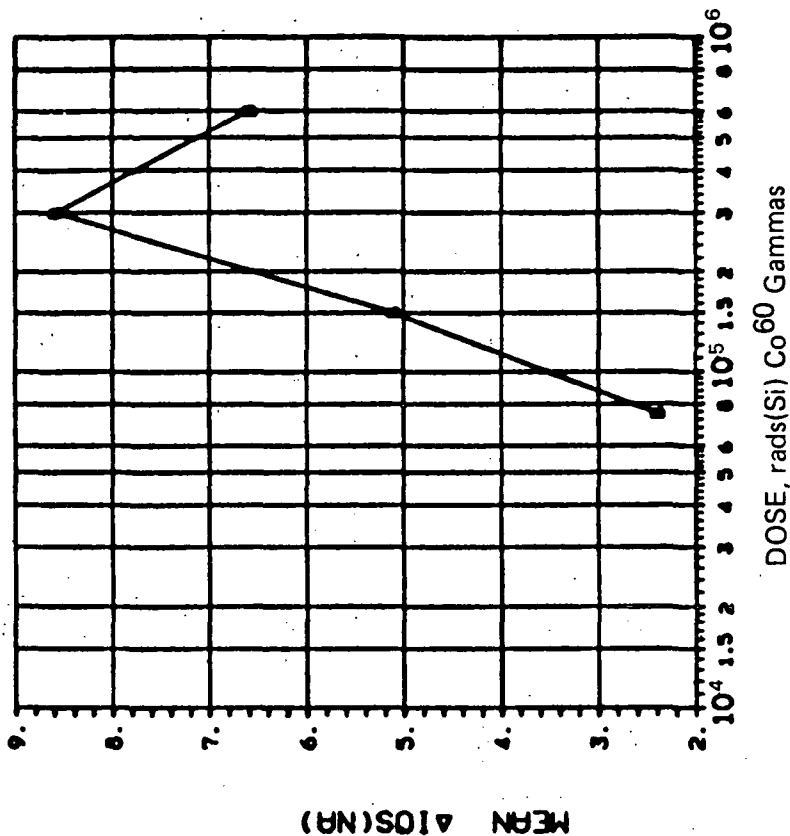
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 |
| | 20 |
| | 30 |
| | 50 |
| | .0796 .1533 .2481 .5818 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0938-2 DATE CODE H240



DOSE, rad(Si) Co60 Gammas

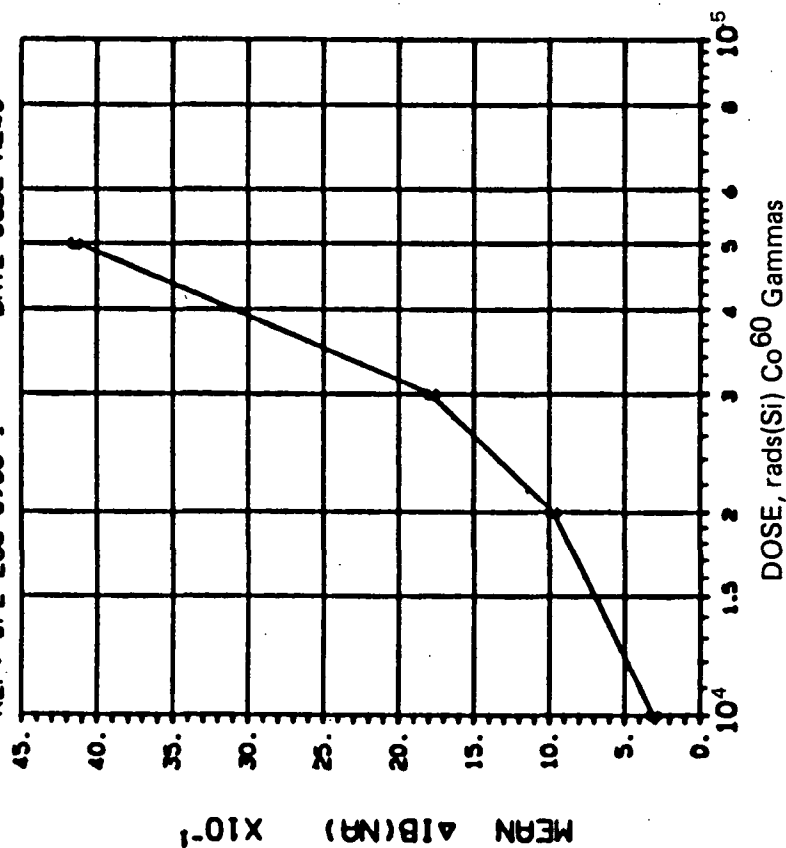
(2)ΔIOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1.341 2.170 4.280 3.698 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC TEST DATE 12-14-82

REF: JPL LOG 0938-1 DATE CODE H240



(3)ΔIB(NA): VS DOSE

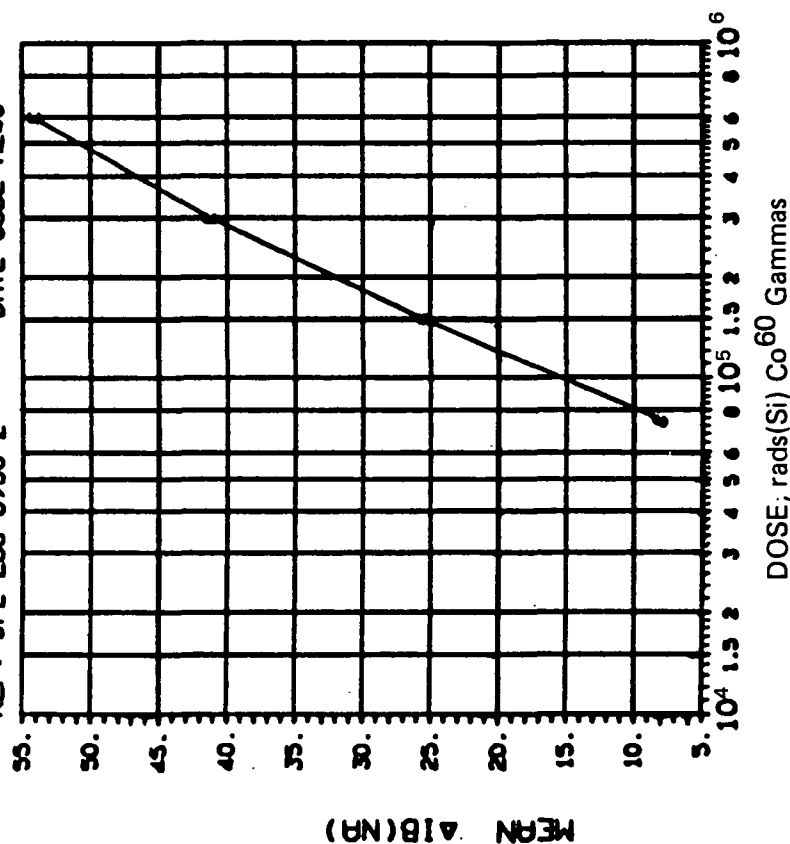
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 10 20 30 50 |
| C | .3260 .6463 1.084 2.122 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC TEST DATE 12-13-82

REF: JPL LOG 0938-2 DATE CODE H240



(3)ΔIB(NA): VS DOSE

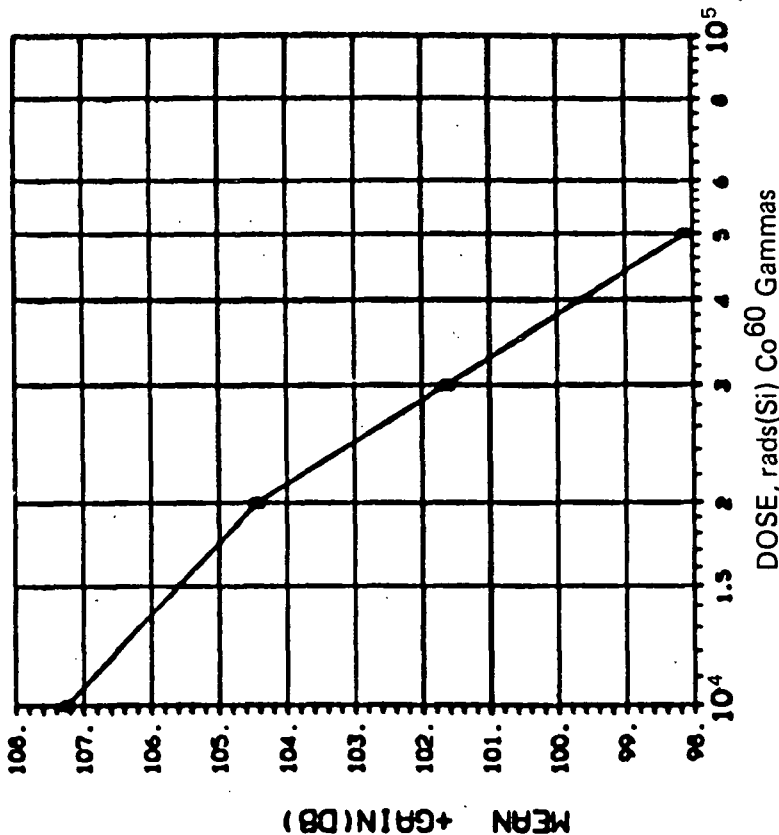
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 75 150 300 600 |
| C | 3.689 10.31 15.20 20.50 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-14-82

REF: JPL LOG 0938-1 DATE CODE H240



(4)+GAIN IN DB(1.0MA LOAD, +10V): VS DOSE

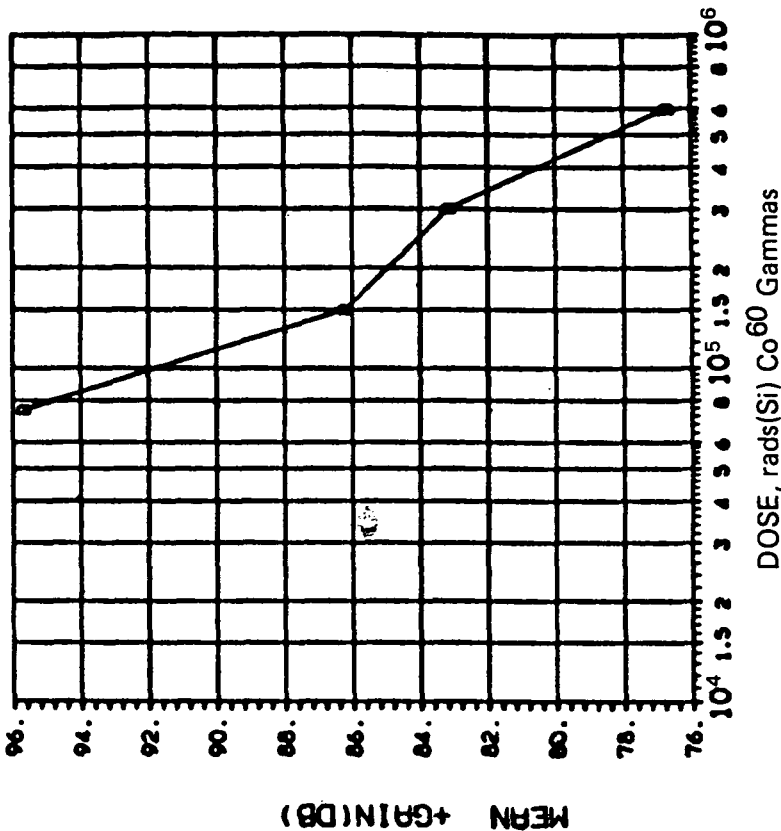
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 5.203 3.774 2.685 1.946 |

INITIAL MEAN VALUE +GAIN(DB) = 1.11X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0938-2 DATE CODE H240



(4)+GAIN IN DB(1.0MA LOAD, +10V): VS DOSE

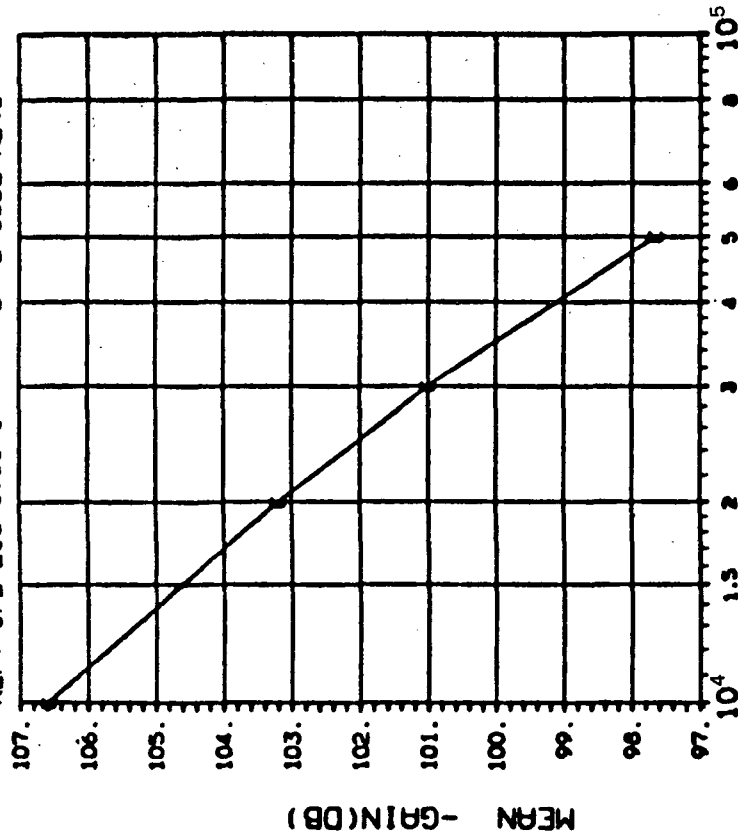
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 1.710 2.611 4.024 6.468 |

INITIAL MEAN VALUE +GAIN(DB) = 1.11X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-14-82

REF: JPL LOG 0938-1 DATE CODE H240



DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

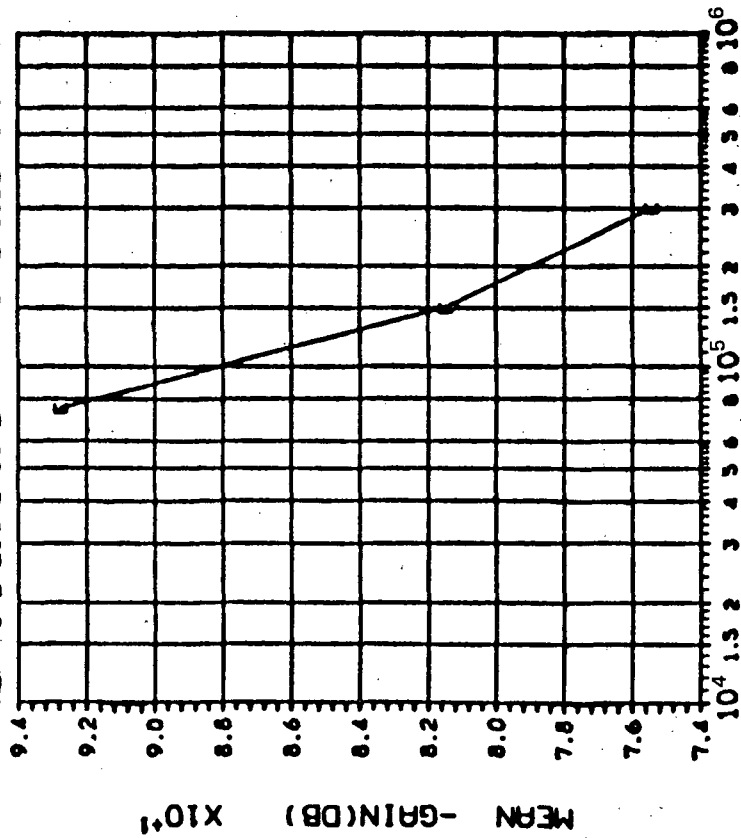
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 2.484 1.603 2.105 1.675 |

INITIAL MEAN VALUE -GAIN(DB) = $1.11 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0938-2 DATE CODE H240



DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 3.186 4.167 3.212 4.444 |

INITIAL MEAN VALUE -GAIN(DB) = $1.11 \times 10^{+2}$

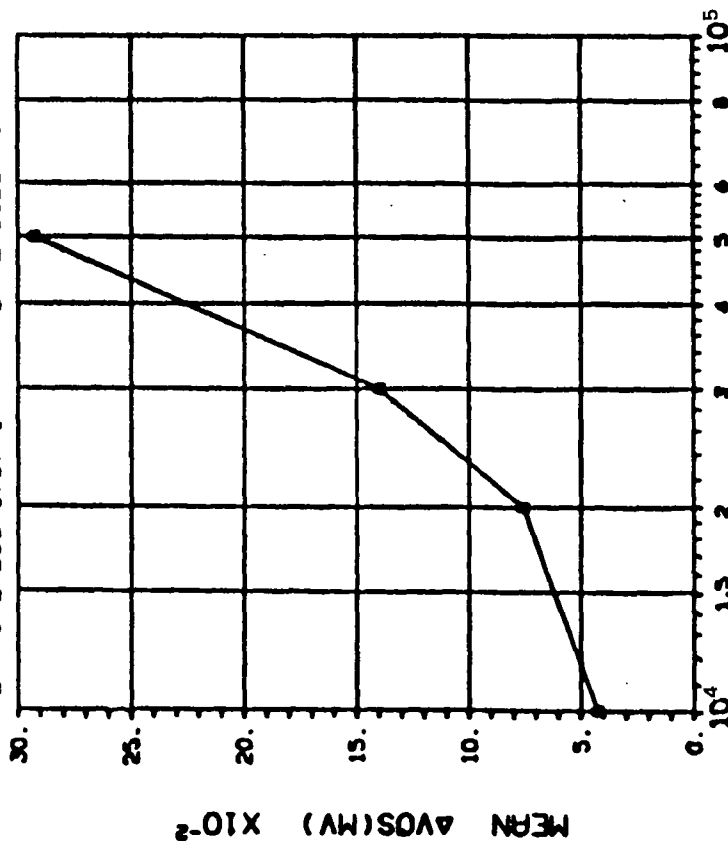
DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES

REF: JPL LOG 0939-1

TEST DATE 12-10-82

DATE CODE H240



DOSE, rads(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 10 20 30 50 |
| A | .0761 .1374 .2016 .2757 |

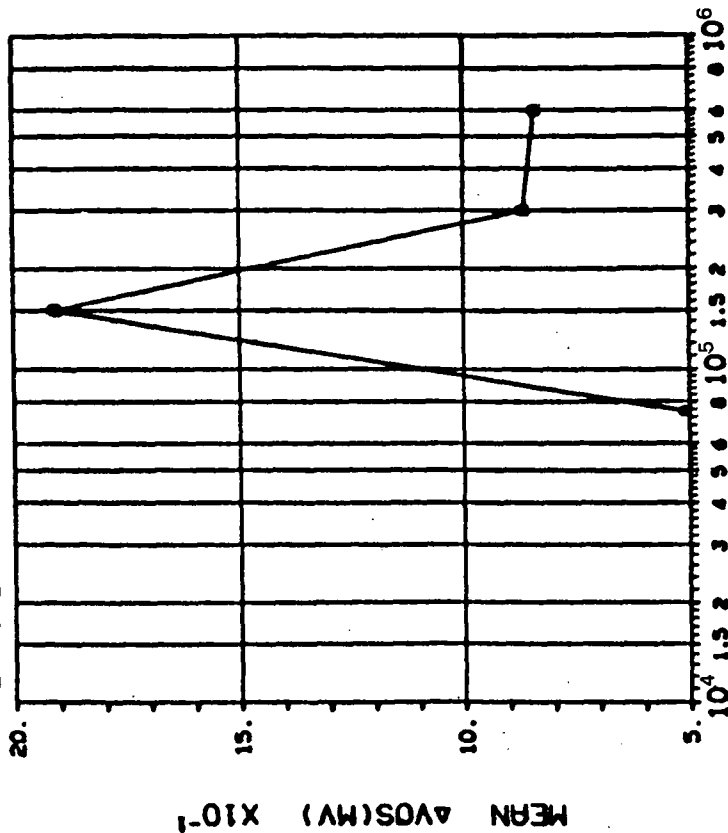
DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES

REF: JPL LOG 0939-2

TEST DATE 12-10-82

DATE CODE H240



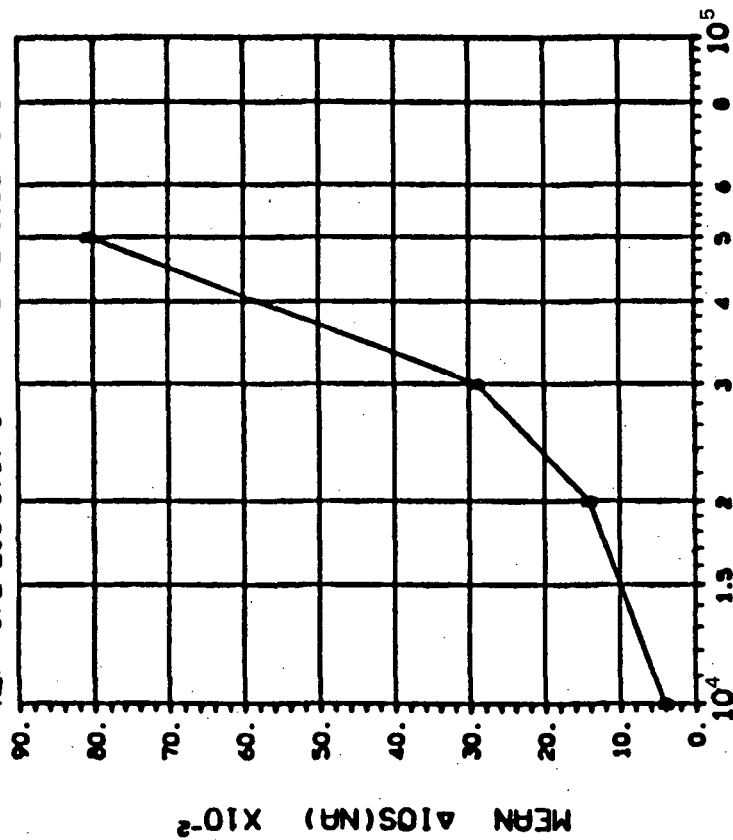
DOSE, rads(Si) Co 60 Gammas

(1)ΔVOS(MV): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 75 150 300 600 |
| A | .2634 1.282 .7573 1.172 |

DEVICE TYPE: LM108 OP AMP
 MFG: NSC 5 DEVICES TEST DATE 12-10-82
 REF: JPL LOG 0939-1 DATE CODE H240



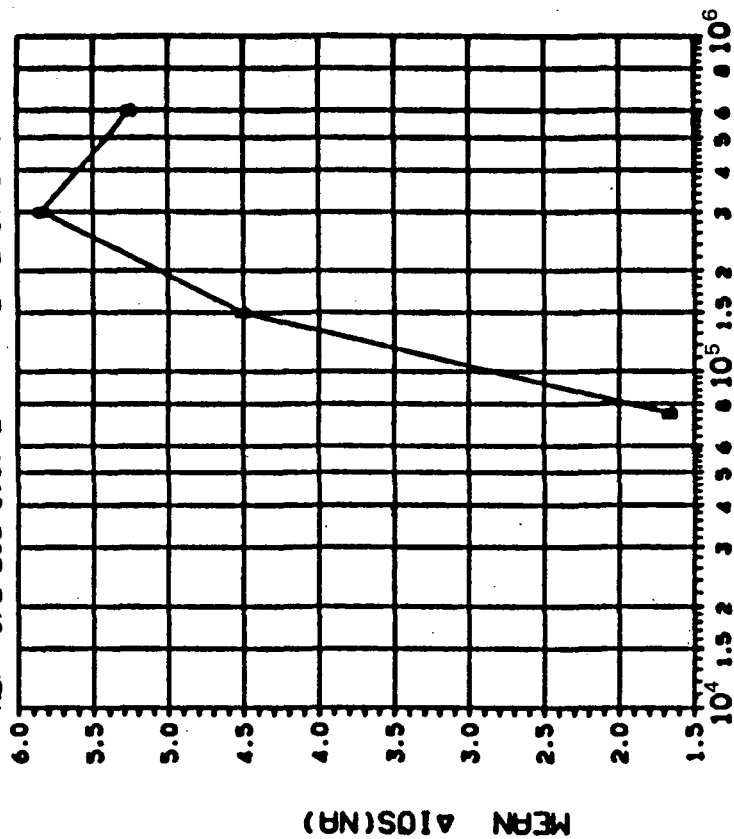
DOSE, rads(Si) Co ⁶⁰ Gammas

(2) Δ IOS(NA): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 10 20 30 50 |
| B | .0468 .0845 .1223 .2306 |

DEVICE TYPE: LM108 OP AMP
 MFG: NSC 5 DEVICES TEST DATE 12-10-82
 REF: JPL LOG 0939-2 DATE CODE H240



DOSE, rads(Si) Co ⁶⁰ Gammas

(2) Δ IOS(NA): VS DOSE

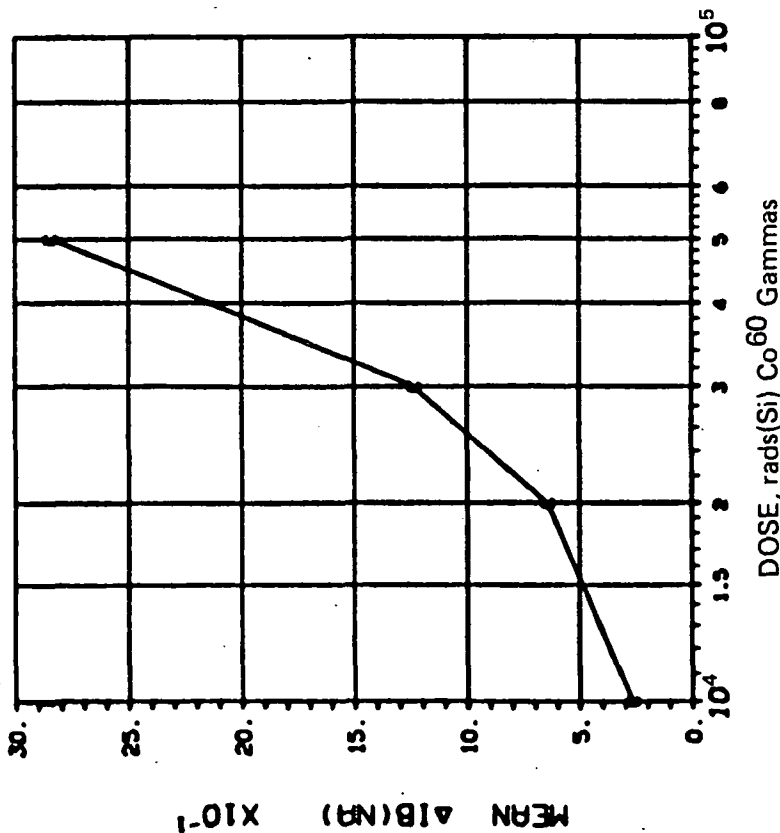
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 75 150 300 600 |
| B | .4384 1.164 1.723 1.413 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-10-82

REF: JPL LOG 0939-1 DATE CODE H240



DOSE, rads(Si) Co⁶⁰ Gammas

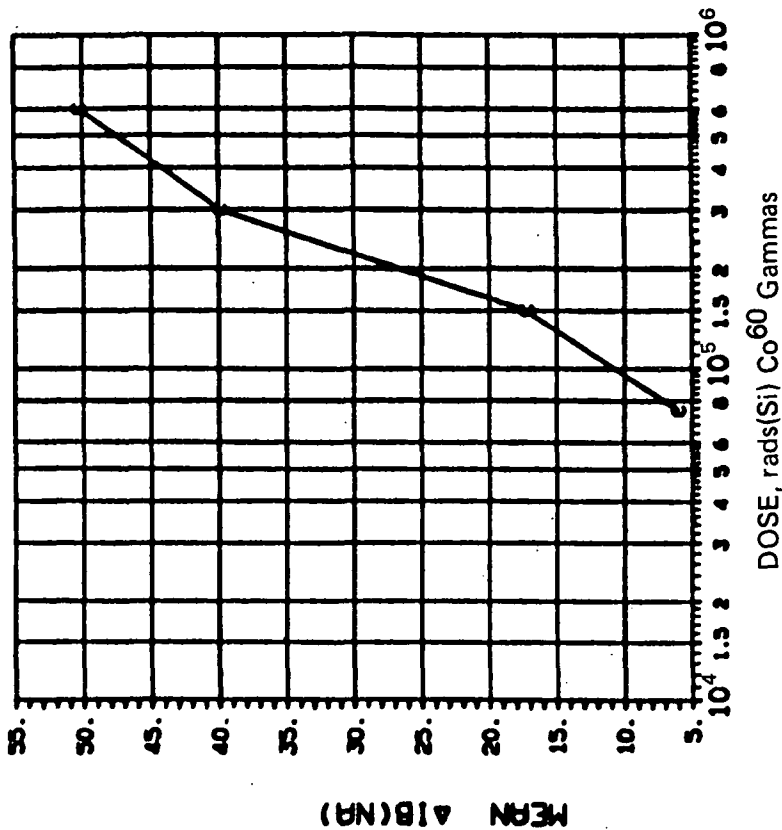
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 10 |
| | 20 |
| | 30 |
| | 50 |
| | .2091 .4436 .6385 1.184 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-10-82

REF: JPL LOG 0939-2 DATE CODE H240



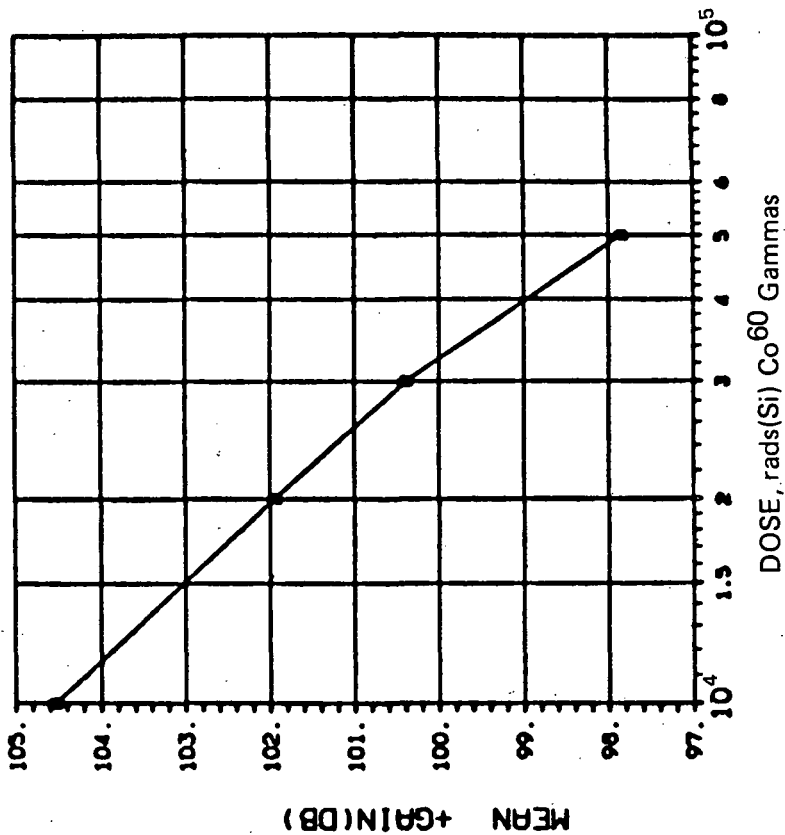
DOSE, rads(Si) Co⁶⁰ Gammas

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1.031 3.046 6.630 11.44 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-10-82
REF: JPL LOG 0939-1 DATE CODE H240



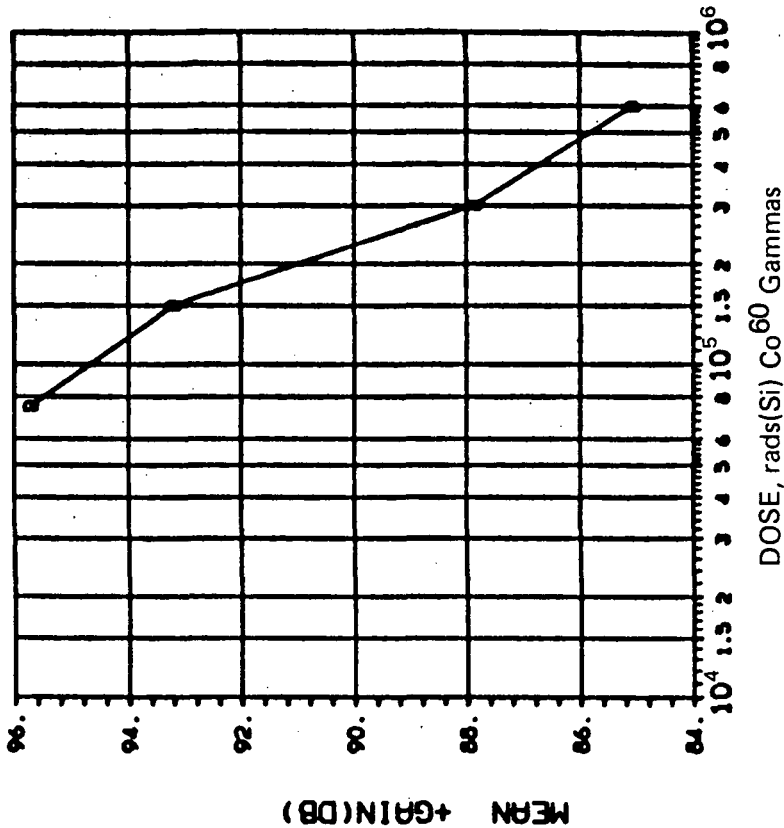
(4)+GAIN IN DB(1.0MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 10 20 30 50 |
| | | 1.646 1.959 2.127 2.069 |

INITIAL MEAN VALUE +GAIN(DB) = $1.05 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-10-82
REF: JPL LOG 0939-2 DATE CODE H240



(4)+GAIN IN DB(1.0MA LOAD,+10V): VS DOSE

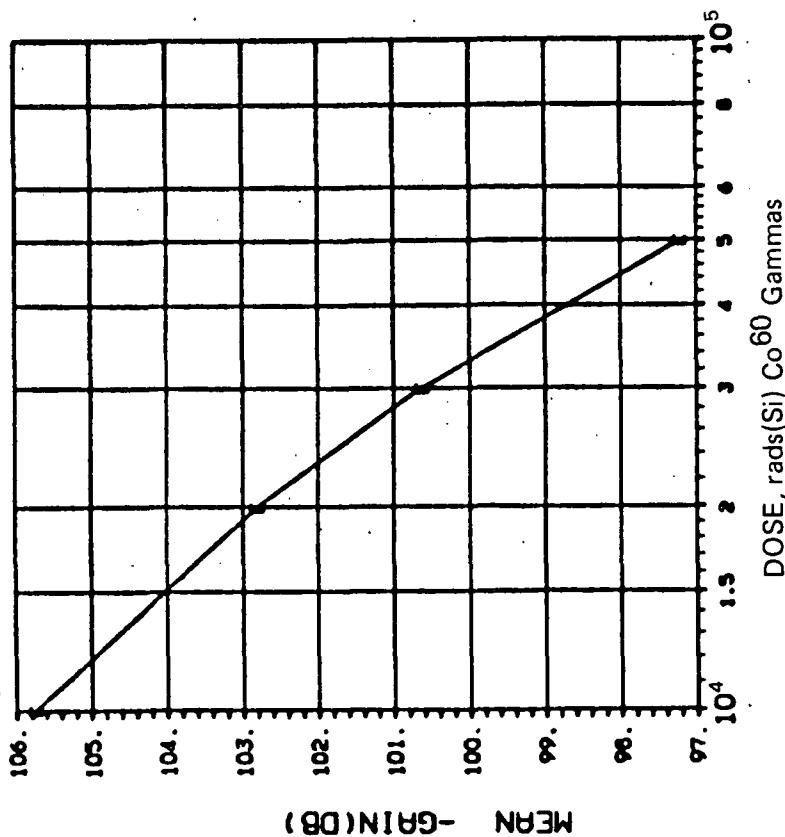
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 600 |
| | | 1.560 1.964 4.671 8.046 |

INITIAL MEAN VALUE +GAIN(DB) = $1.05 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-10-82

REF: JPL LOG 0939-1 DATE CODE H240



(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

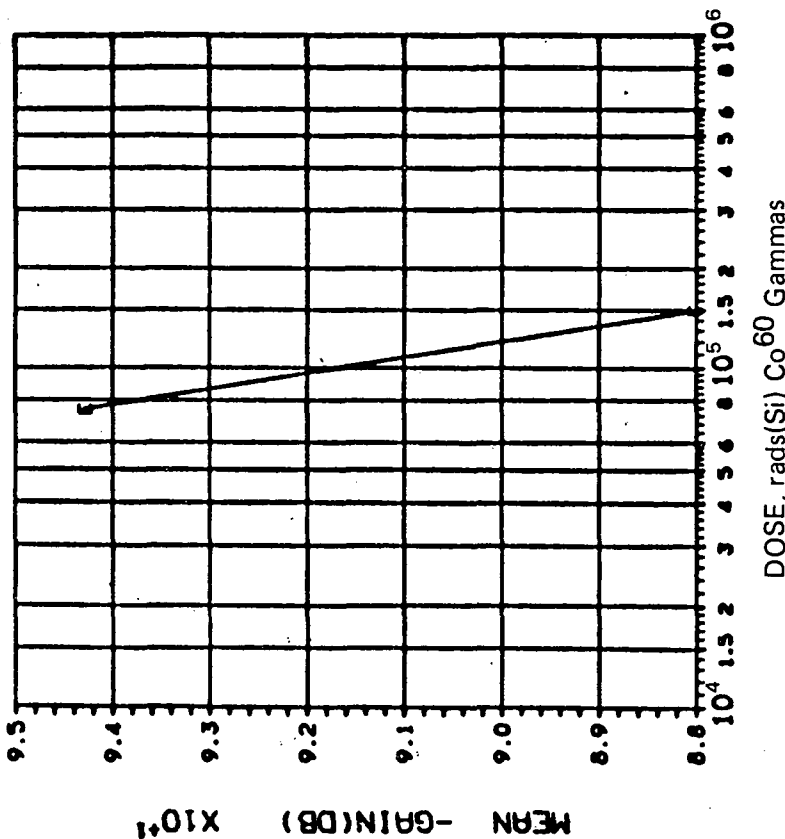
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 2.460 2.223 2.234 2.361 |

INITIAL MEAN VALUE -GAIN(DB) = 1.07×10^{12}

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-10-82

REF: JPL LOG 0939-2 DATE CODE H240



(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

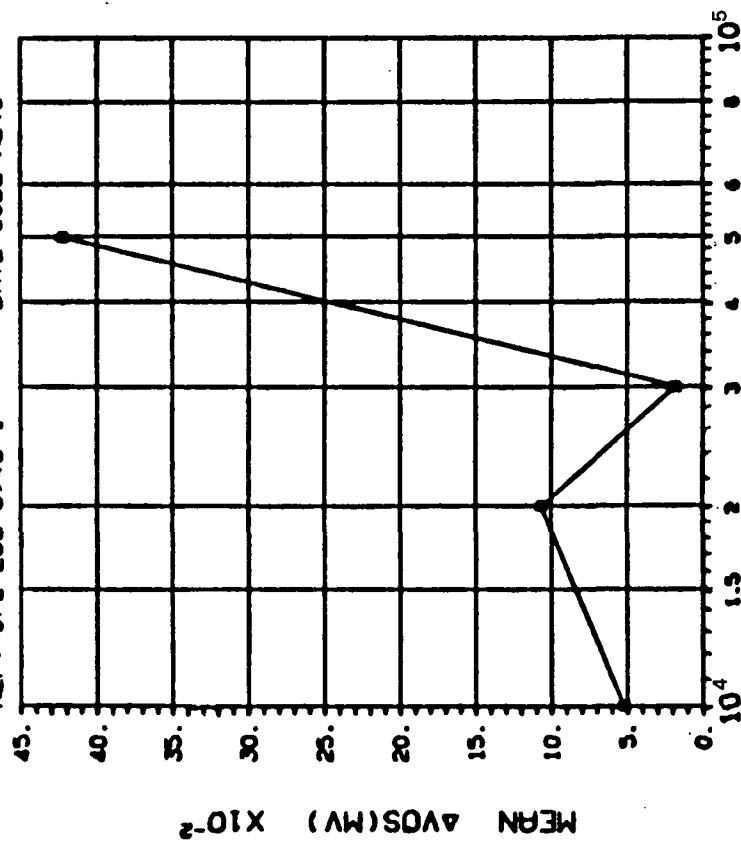
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 2.684 3.601 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 1.07×10^{12}

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-1 DATE CODE H240



DOSE, rads(Si) Co 60 Gammas

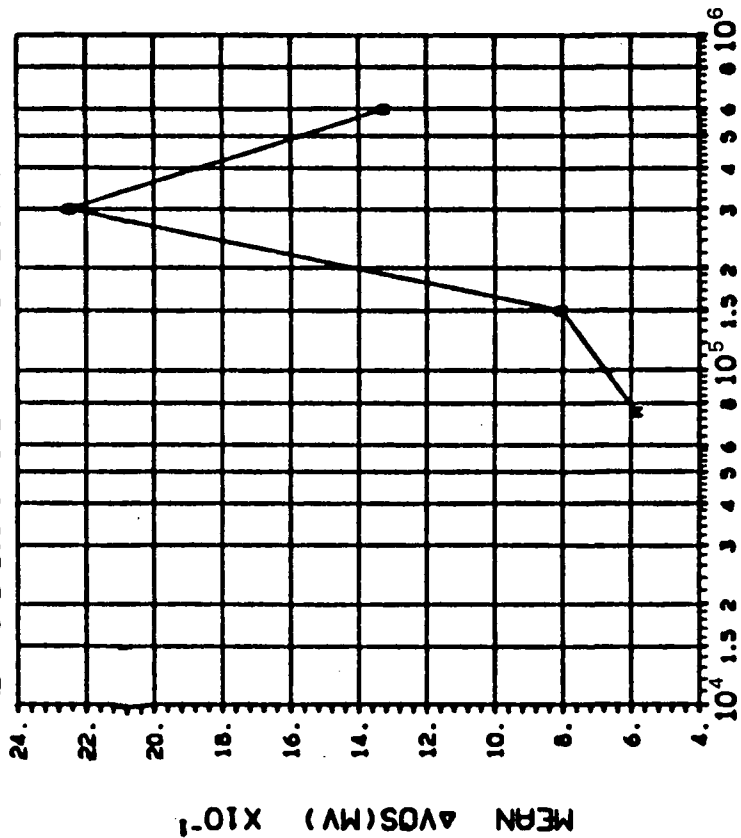
(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| A | .0220 | .0376 .4499 .1404 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-2 DATE CODE H240



DOSE, rads(Si) Co 60 Gammas

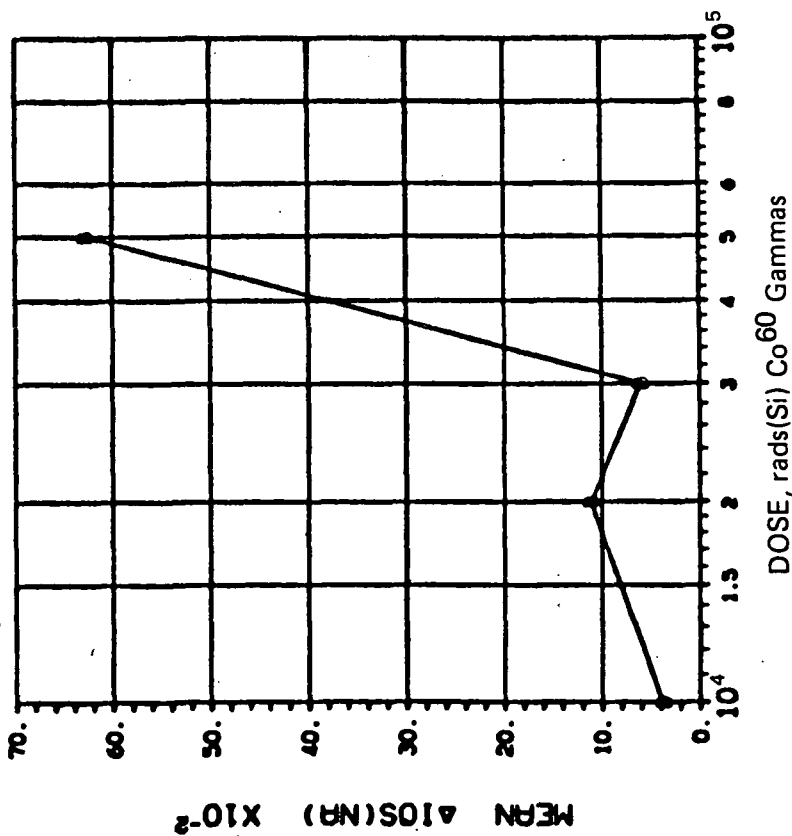
(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| A | .1677 | 2.871 2.676 1.920 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-1 DATE CODE H240



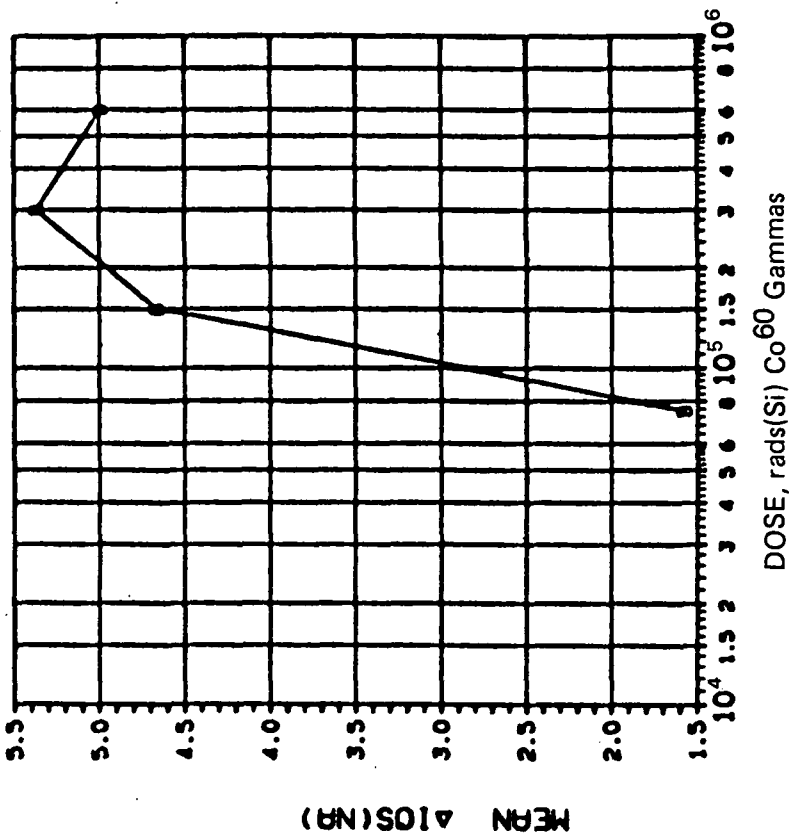
(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 20 30 50 |
| | .0260 .0445 1.331 .2228 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-2 DATE CODE H240



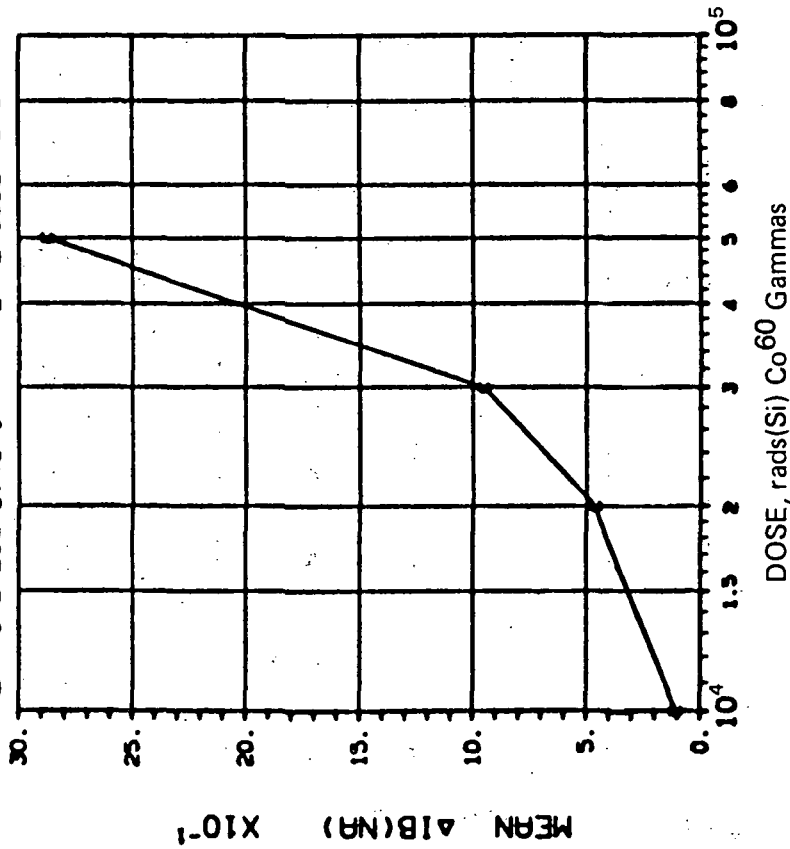
(2) Δ IOS(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 150 300 600 |
| | .7562 2.503 1.816 1.443 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-1 DATE CODE H240



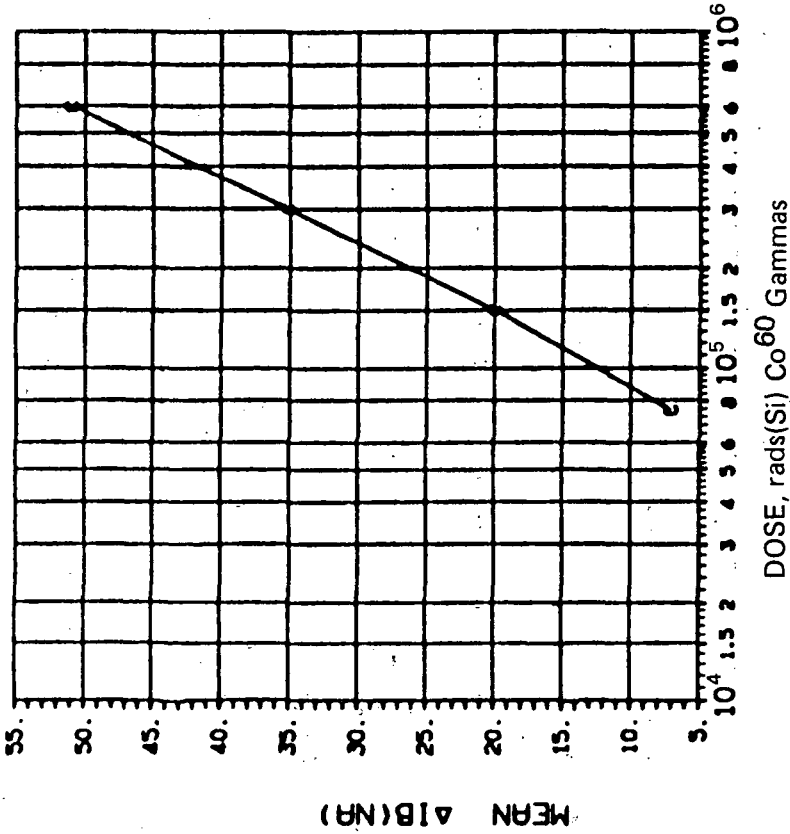
(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .1024 | .3360 .6749 1.420 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-2 DATE CODE H240



(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 150 300 600 |
| C | 2.662 | 6.176 9.599 11.40 |

DEVICE TYPE: LM108 OP AMP

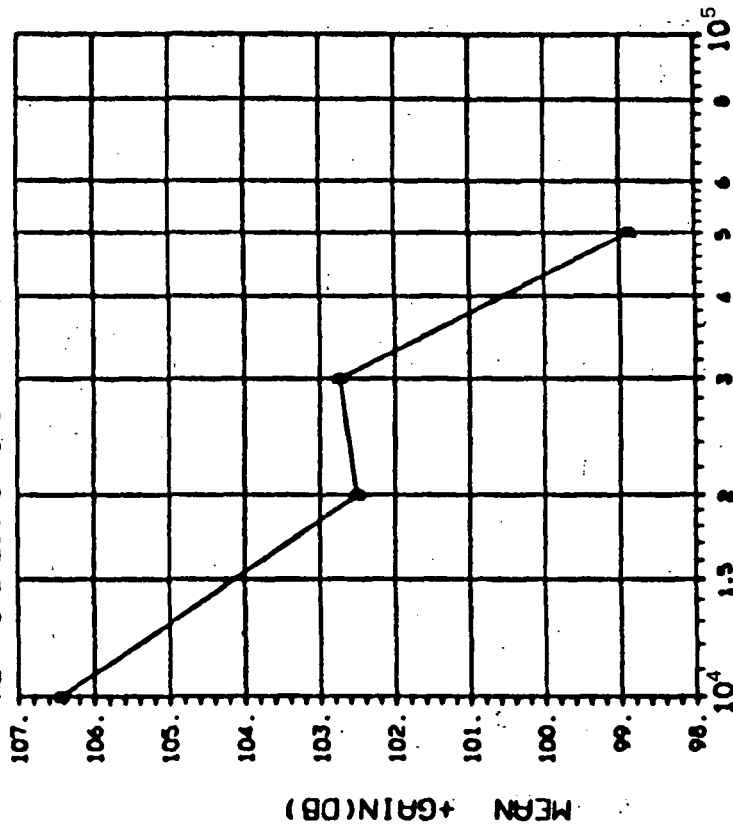
MFG: NSC

5 DEVICES

TEST DATE 12-13-82

REF: JPL LOG 0940-1

DATE CODE M240



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.0MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 10 20 30 50 |
| | | 3.328 3.350 3.480 5.301 |

INITIAL MEAN VALUE +GAIN(DB) = 1.06X10¹²

DEVICE TYPE: LM108 OP AMP

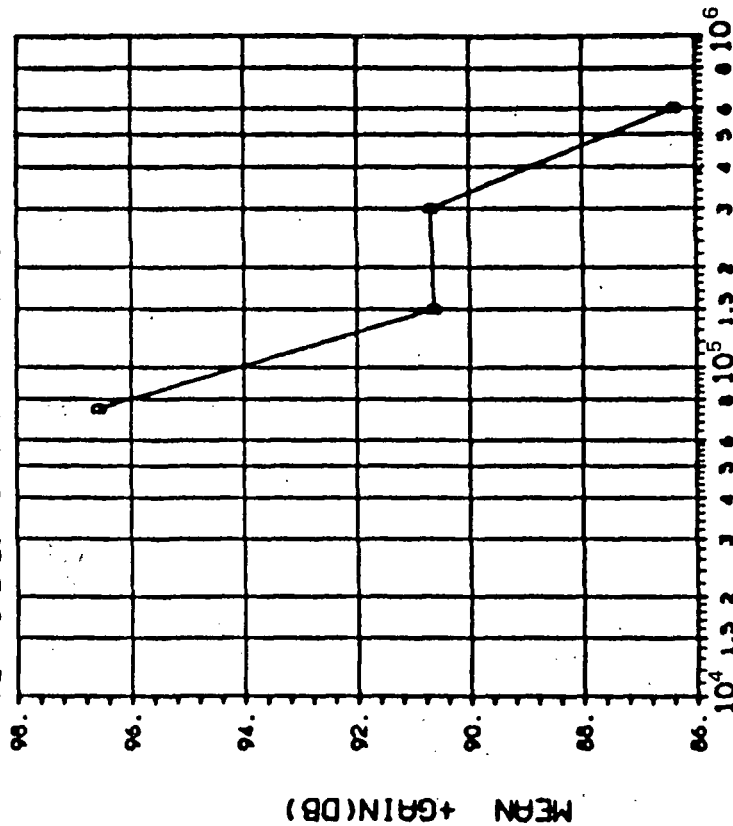
MFG: NSC

5 DEVICES

TEST DATE 12-13-82

REF: JPL LOG 0940-2

DATE CODE M240



DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.0MA LOAD,+10V): VS DOSE

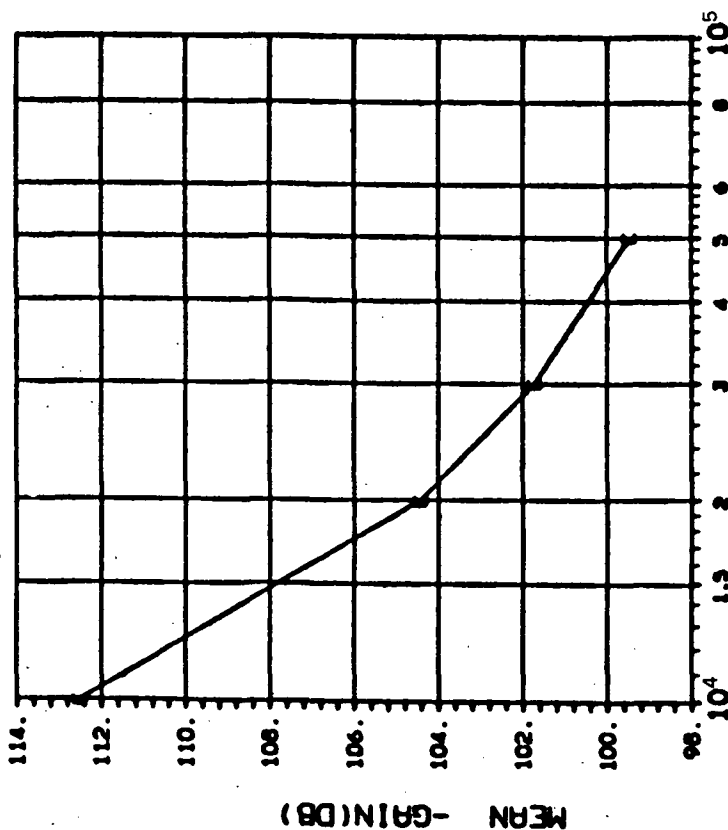
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 75 150 300 600 |
| | | 3.703 3.212 6.016 5.508 |

INITIAL MEAN VALUE +GAIN(DB) = 1.06X10¹²

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-1 DATE CODE H240



DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

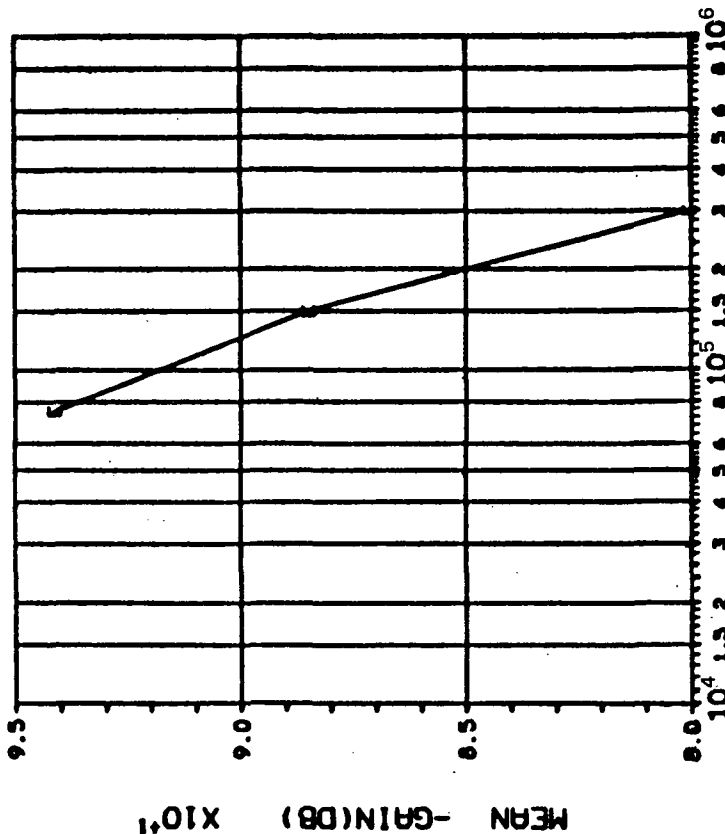
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10.35 2.649 3.062 2.654 |

INITIAL MEAN VALUE -GAIN(DB) = 1.13X10¹²

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 12-13-82

REF: JPL LOG 0940-2 DATE CODE H240



DOSE, rads(Si) Co⁶⁰ Gammas

(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

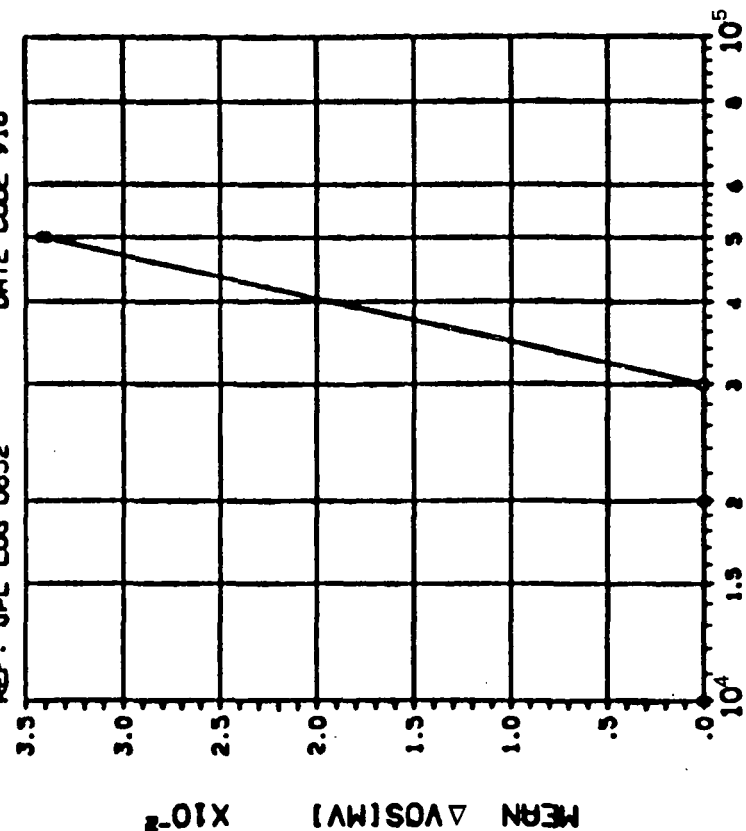
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 2.556 6.110 4.778 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 1.13X10¹²

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0852 DATE CODE 916



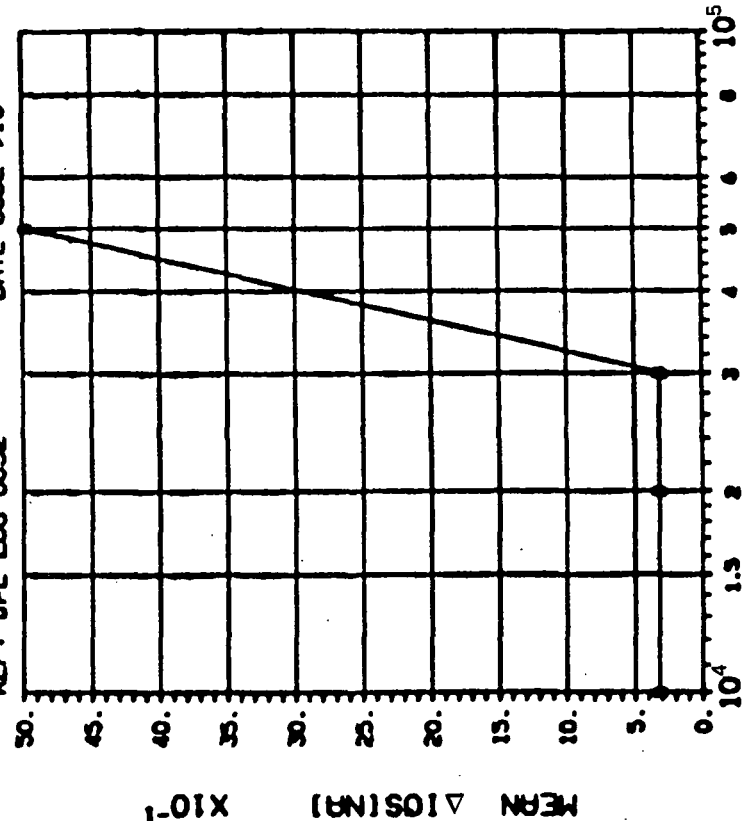
DOSE, rads(Si) 2.5 MeV electrons
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 75 |
| A | .3946 | .0243 | .0446 | 3.181 ***** |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0852 DATE CODE 916



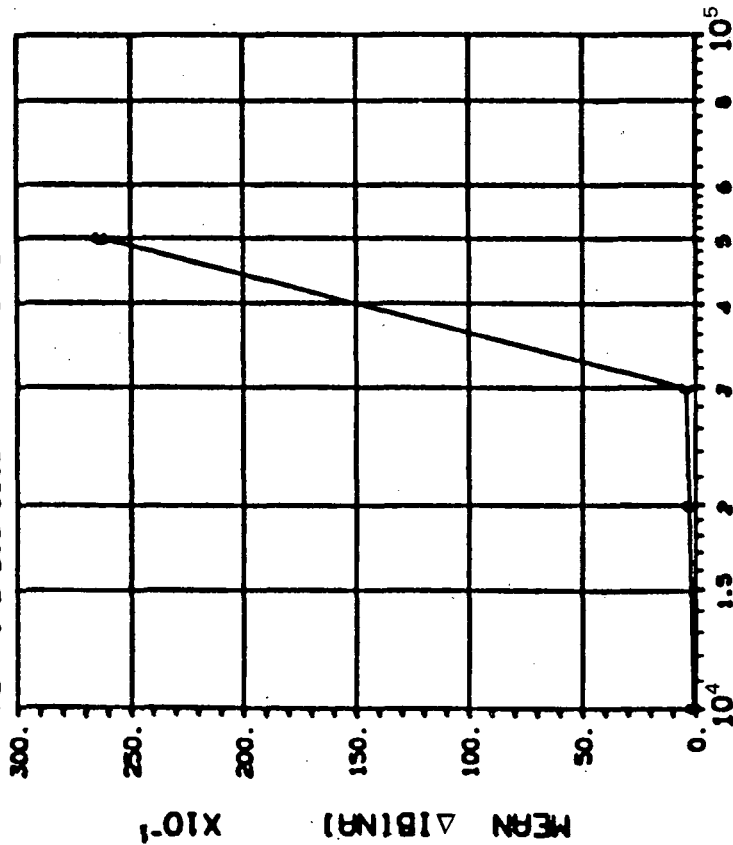
DOSE, rads(Si) 2.5 MeV electrons
(2)ΔIOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 75 |
| B | .2062 | .4328 | .4306 | 3.151 ***** |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0852 DATE CODE 916



DOSE, rads(Si) 2.5 MeV electrons

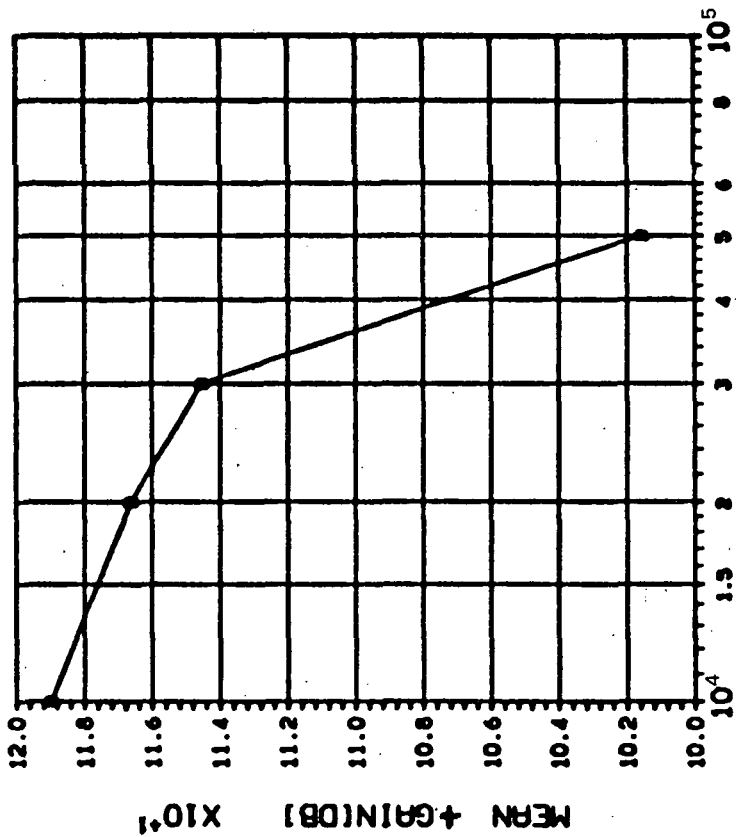
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 10 | 20 | 30 | 50 |
| C | .0712 | .1097 | .2179 | 6.993 ***** |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 01-13-83

REF: JPL LOG 0852 DATE CODE 916



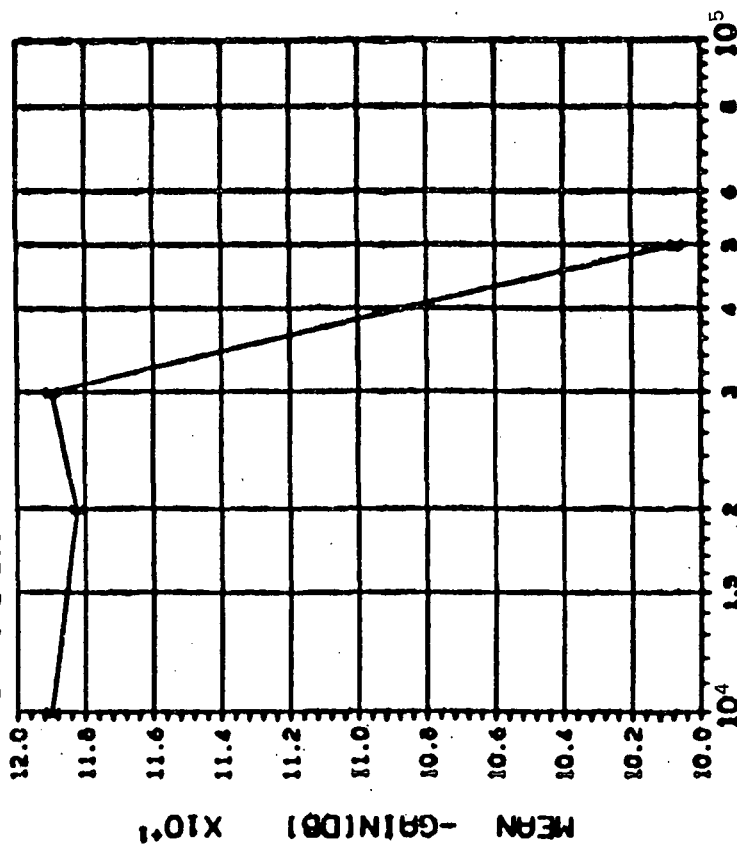
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.1MA LOAD,+10V) VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|---------------------|--------------------|-------|-------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| | 1.00 | 10 | 20 | 30 |
| D | 1.00 | 11.80 | 9.776 | 6.712 3.434 ***** |

INITIAL MEAN VALUE +GAIN(DB) = 1.18X10⁺²

DEVICE TYPE: LM108 OP AMP
 MFG: NSC 3 DEVICES TEST DATE 01-13-83
 REF: JPL LOG 0852 DATE CODE 916



DOSE, rads(Si) 2.5 MeV electrons

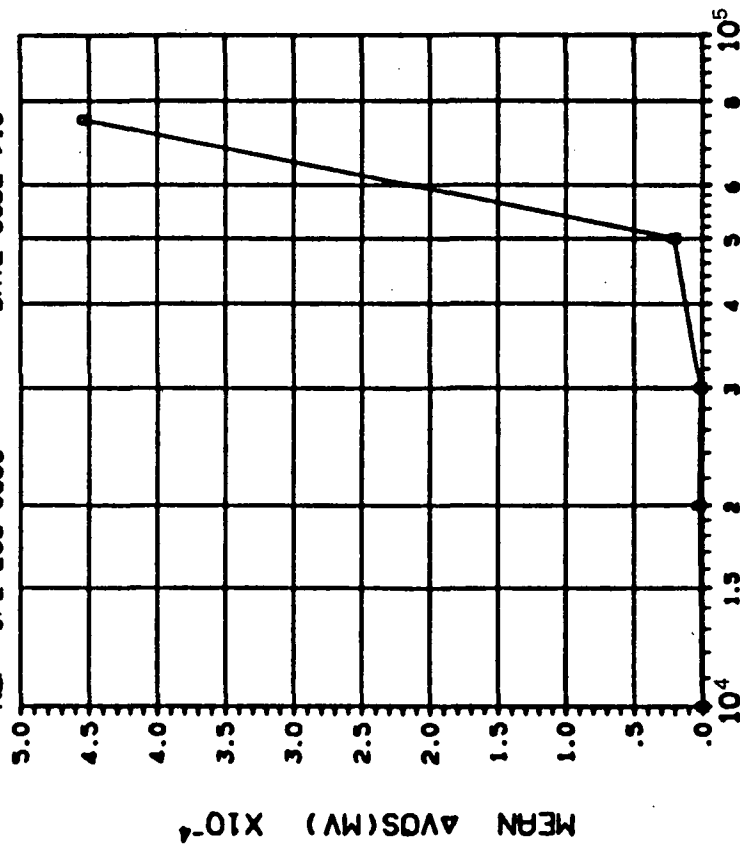
15) -GAIN IN DB (1.1 MA LOAD, -10V) & VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| | | 10 | 20 | 30 |
| E | 1.00 | 4.533 | 5.127 | 6.439 |
| | | 1.421 | 1.421 | 1.421 |

INITIAL MEAN VALUE -GAIN(DB) = 1.18x10⁺²

DEVICE TYPE: LM108 OP AMP
MFG: NSC 5 DEVICES
REF: JPL LOG 0853

TEST DATE 02-10-83
DATE CODE 916

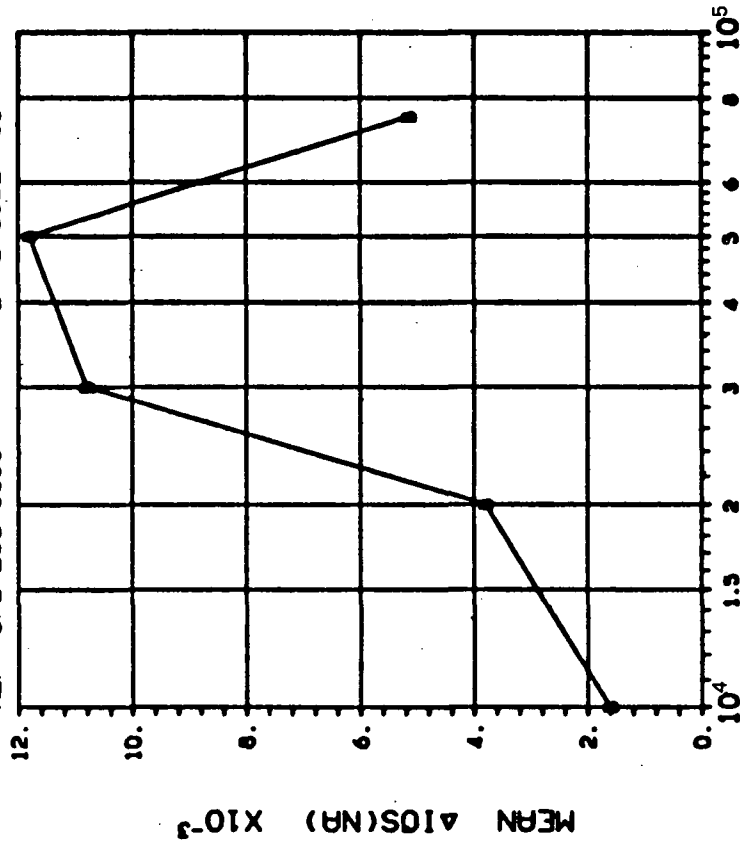


DOSE, rads(Si) Co⁶⁰ Gammas
(1)ΔVOS(MV): VS DOSE

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------------|
| | 10 | 20 | 30 | 50 |
| A | .0170 | .0168 | .0178 | .0318 .4821 |

DEVICE TYPE: LM108 OP AMP
MFG: NSC 5 DEVICES
REF: JPL LOG 0853

TEST DATE 02-10-83
DATE CODE 916



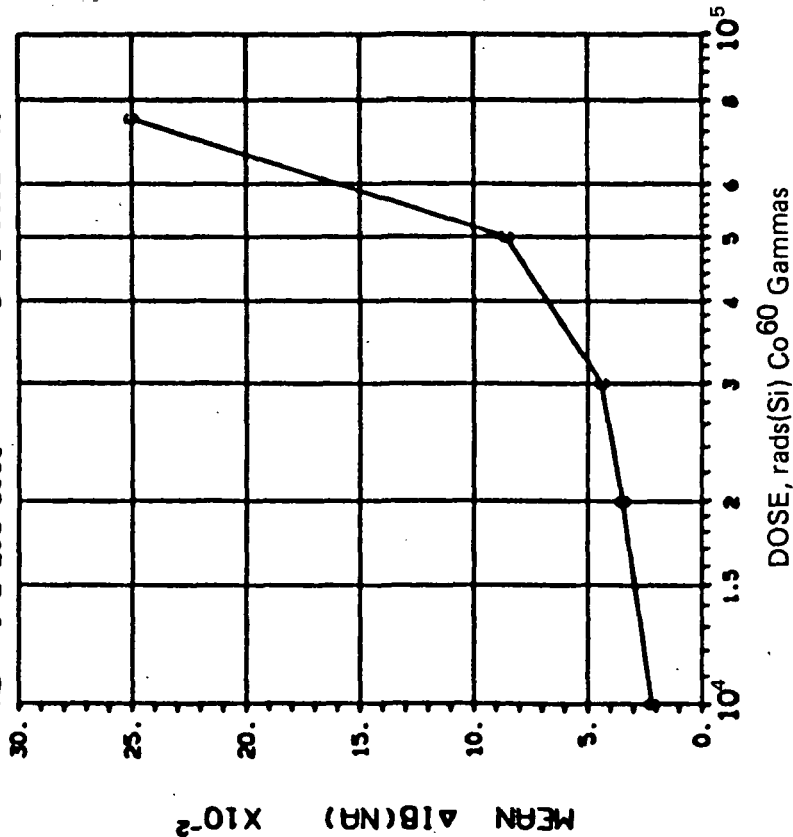
DOSE, rads(Si) Co⁶⁰ Gammas
(2)ΔIOS(NR): VS DOSE

| CURVE | DOSE, kilorads(Si) | | | |
|-------|--------------------|-------|-------|-------------|
| | 10 | 20 | 30 | 50 |
| B | .0053 | .0036 | .0099 | .0125 .0293 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-10-83

REF: JPL LOG 0853 DATE CODE 916



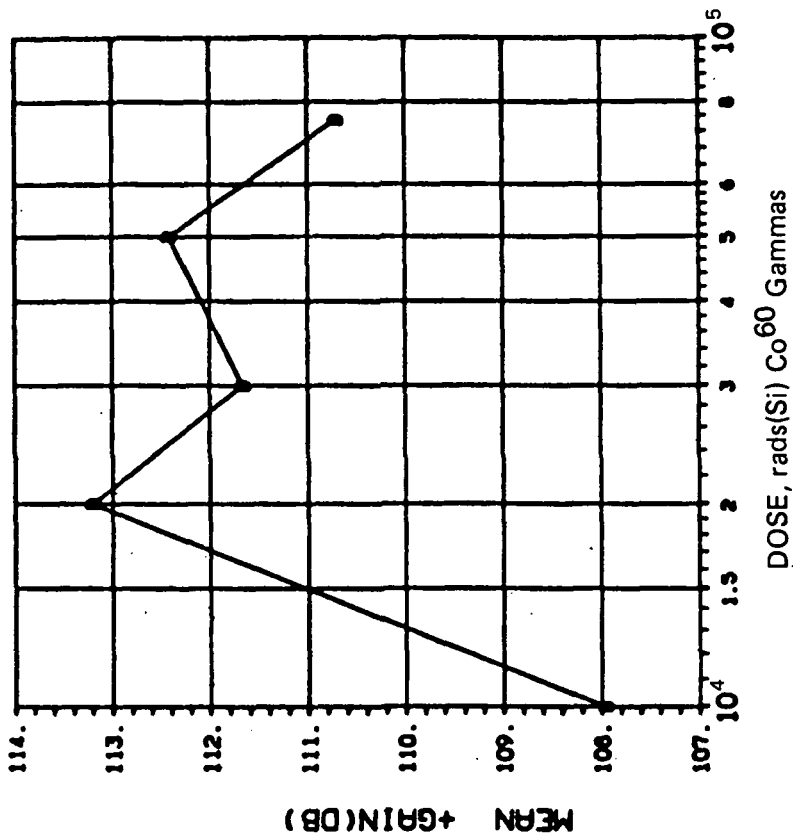
(3) ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 10 | .0194 |
| | 20 | .0452 |
| | 30 | .0718 |
| | 50 | .1273 |
| | 75 | .5879 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-10-83

REF: JPL LOG 0853 DATE CODE 916

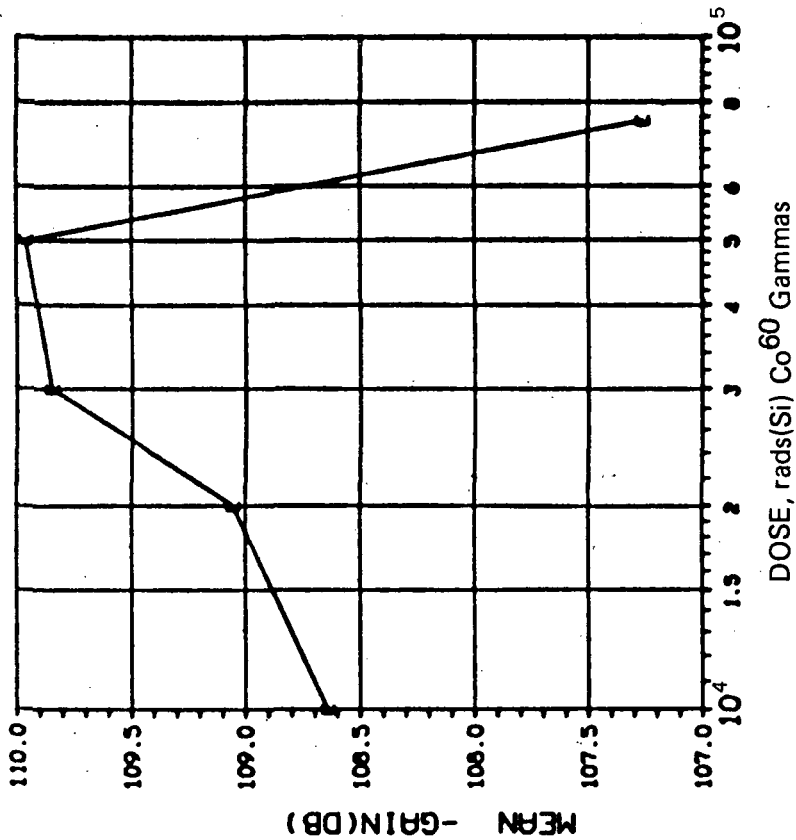


(4) +GAIN IN DB(1.1MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| D | 10 | 15.52 |
| | 20 | 22.04 |
| | 30 | 19.13 |
| | 50 | 21.28 |
| | 75 | 18.20 |

INITIAL MEAN VALUE +GAIN(DB) = 1.06x10¹²

DEVICE TYPE: LM108 OP AMP
 MFG: NSC 5 DEVICES TEST DATE 02-10-83
 REF: JPL LOG 0853 DATE CODE 916



(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|-------------------------------|--|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| E | 1.00 | 10 20 30 50 75 | |
| | | 9.618 9.591 11.18 10.07 7.914 | |

INITIAL MEAN VALUE -GAIN(DB) = $1.10 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES

TEST DATE 02-01-83

REF: JPL LOG 0831

DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .0272 .0698 .1430 .2788 .3734 |

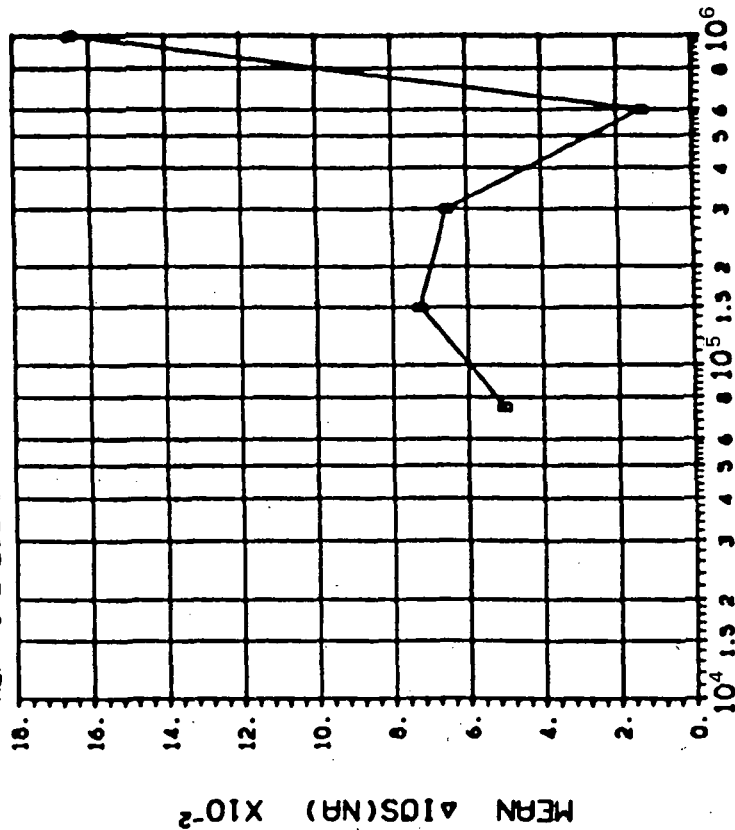
DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES

TEST DATE 02-01-83

REF: JPL LOG 0831

DATE CODE NONE



DOSE, rads(Si) Co⁶⁰ Gammas

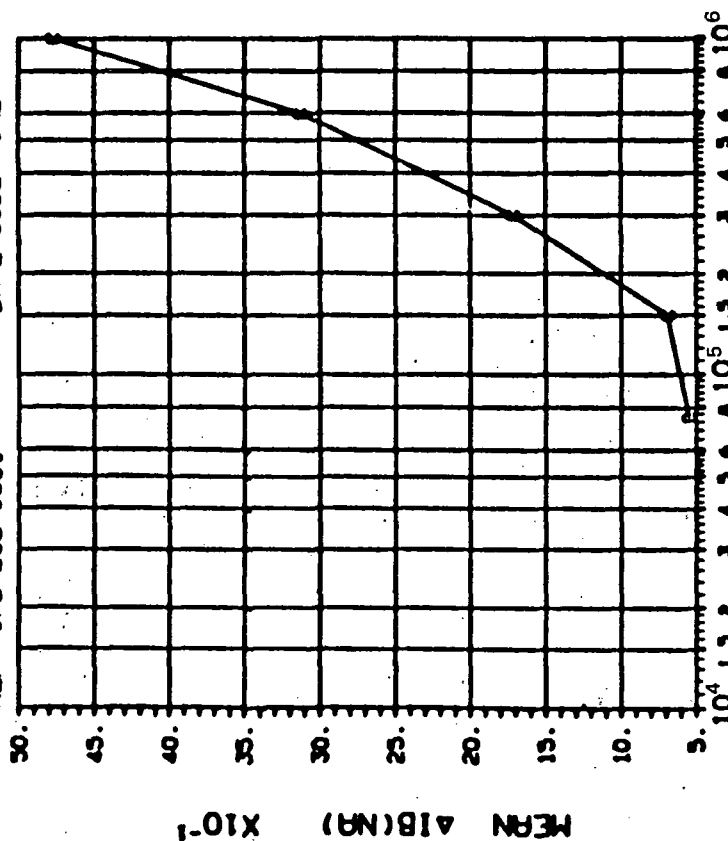
(2) ΔIOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .0327 .0308 .0336 .1100 .1305 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-01-83

REF: JPL LOG 0831 DATE CODE NONE



DOSE, rads(Si) Co 60 Gammas

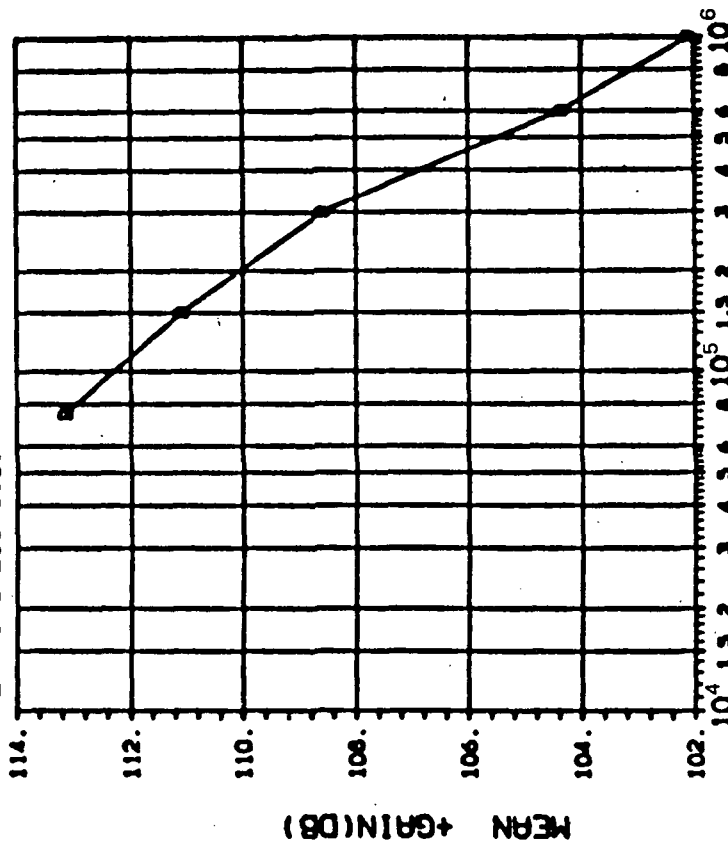
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 75 | .4605 |
| | 150 | .9419 |
| | 300 | .4677 |
| | 600 | .7295 |
| | 1000 | 1.014 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-01-83

REF: JPL LOG 0831 DATE CODE NONE



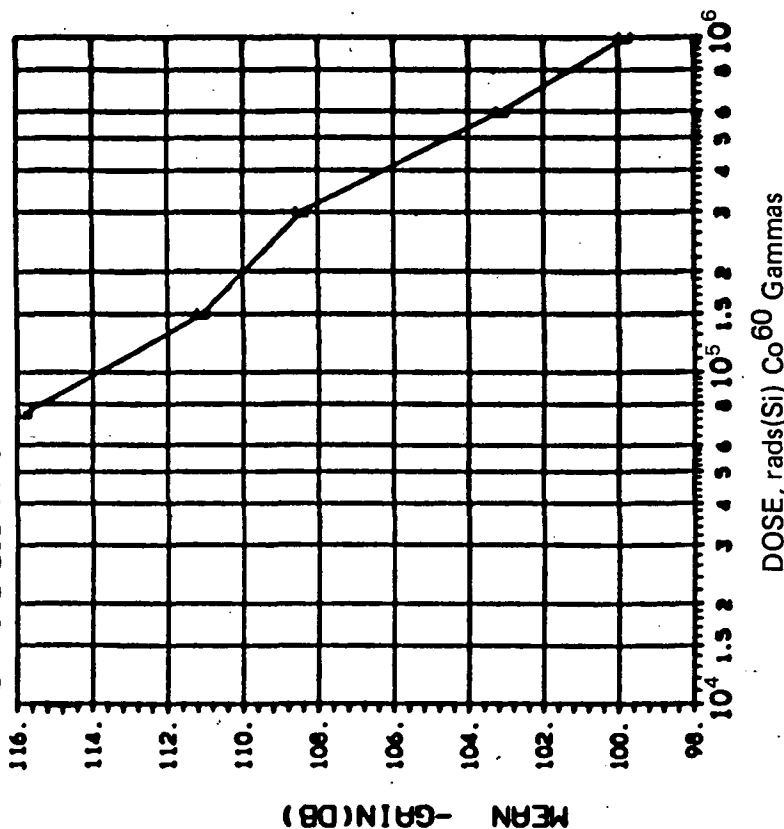
DOSE, rads(Si) Co 60 Gammas

(4)+GAIN IN DB(1.1MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|--------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| D | 1.00 | 6.771 |
| | | 4.024 |
| | | 4.063 |
| | | 4.208 |
| | | 3.469 |

INITIAL MEAN VALUE +GAIN(DB) = 1.13 × 10¹²

DEVICE TYPE: LM108 OP AMP
 MFG: NSC 5 DEVICES TEST DATE 02-01-83
 REF: JPL LOG 0831 DATE CODE NONE

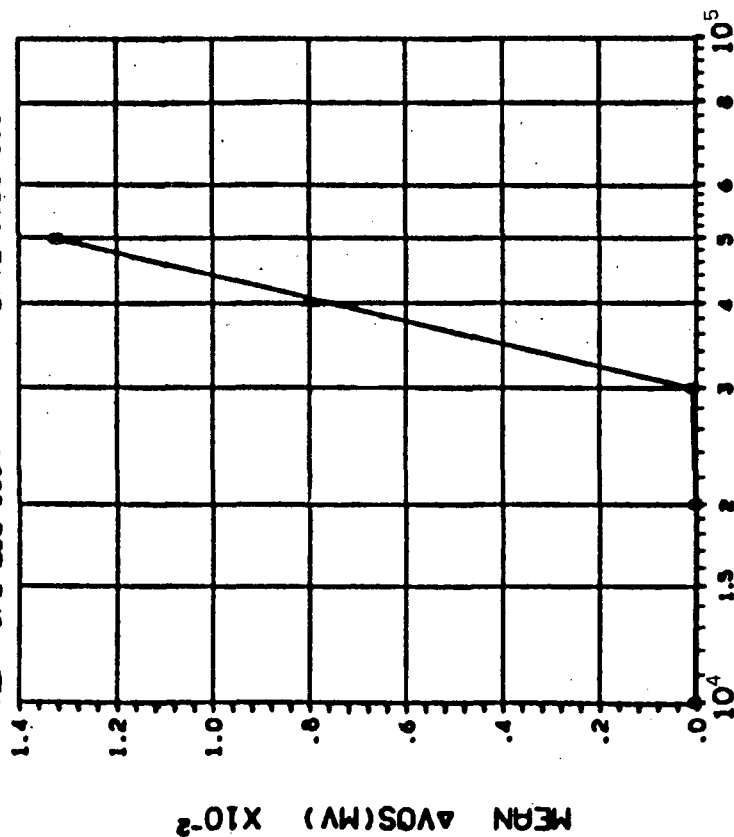


(5)-GAIN IN DB(1.MA LOPO, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 1000 |
| | | 5.892 3.296 4.579 10.09 9.753 |

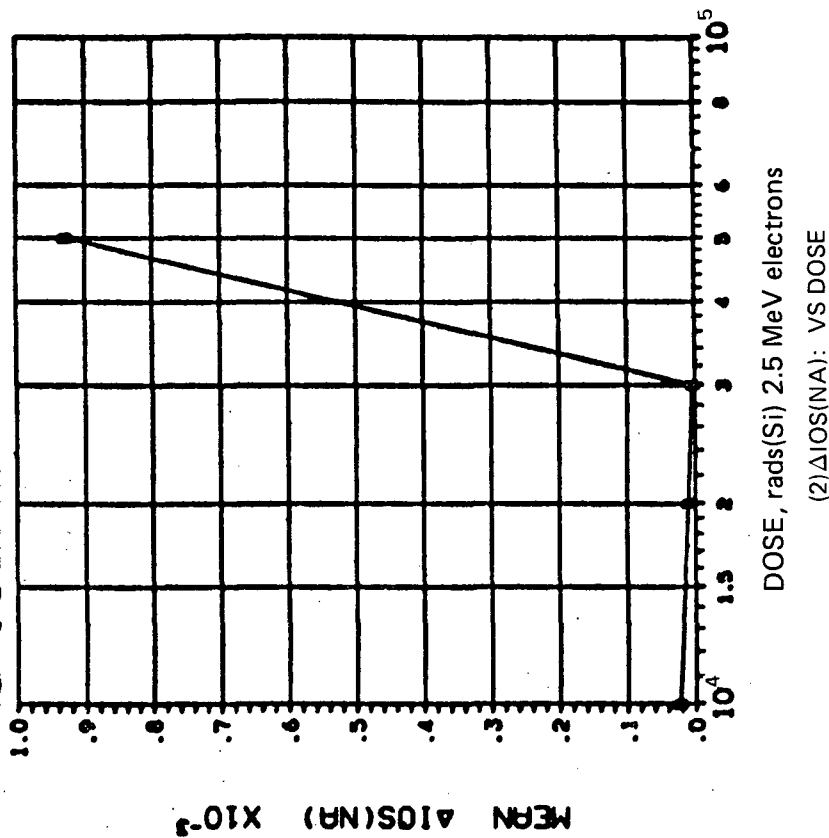
INITIAL MEAN VALUE -GAIN(DB) = $1.16 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP
MFG: NSC 3 DEVICES TEST DATE 01-14-83
REF: JPL LOG 0854 DATE CODE 008



| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 10 20 30 50 |
| | .0537 .0455 .0470 7.788 |

DEVICE TYPE: LM108 OP AMP
MFG: NSC 3 DEVICES TEST DATE 01-14-83
REF: JPL LOG 0854 DATE CODE 008

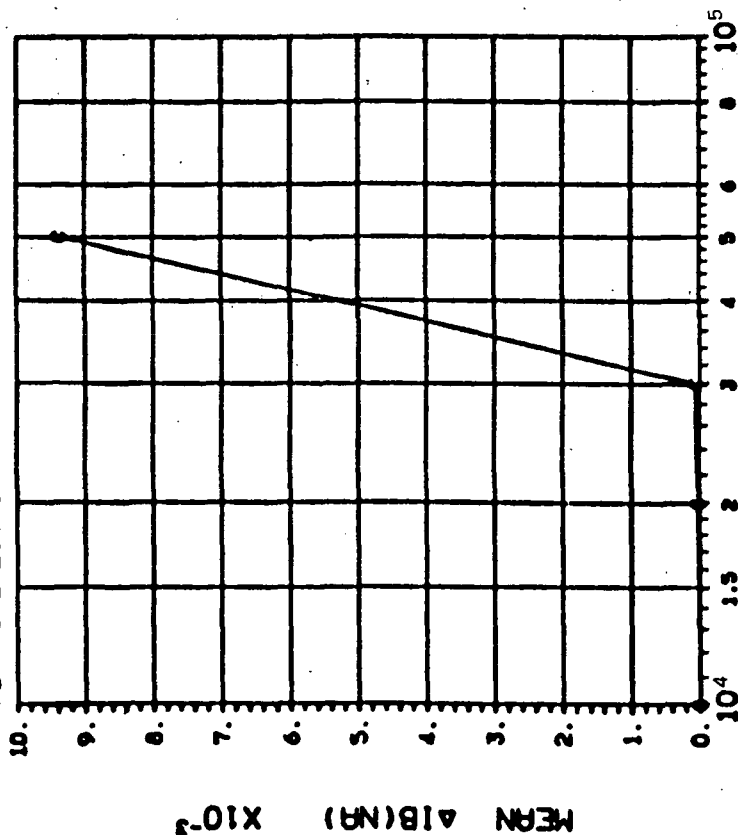


| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 10 20 30 50 |
| | .0493 .0508 .0570 .6358 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC TEST DATE 01-14-83

REF: JPL LOG 0854 DATE CODE 008



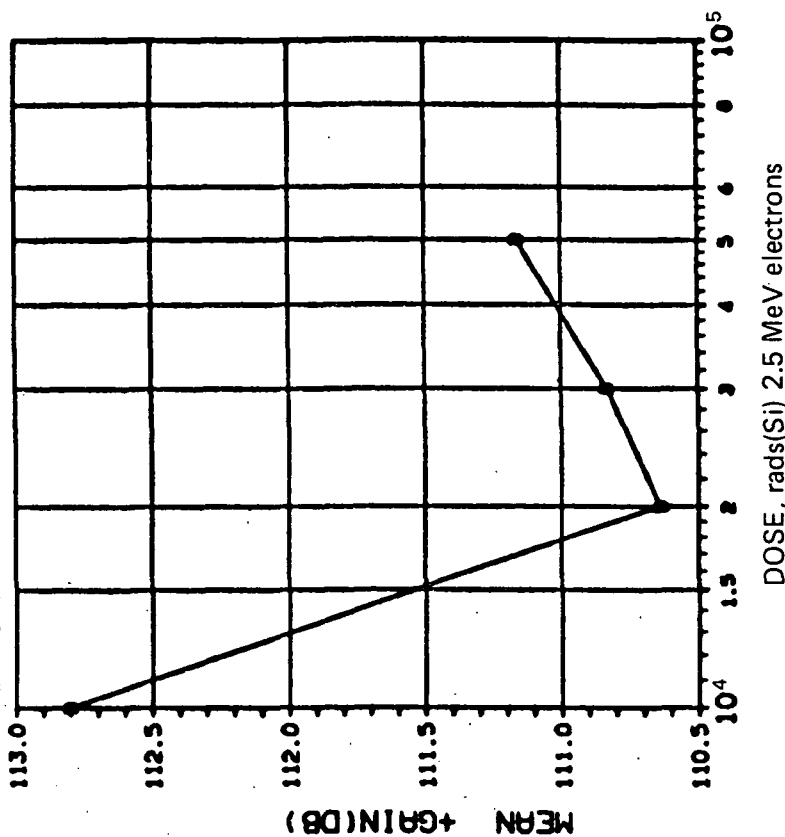
(3) $\Delta IB (NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| C | .0455 .0914 | .1769 9.286 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC TEST DATE 01-14-83

REF: JPL LOG 0854 DATE CODE 008

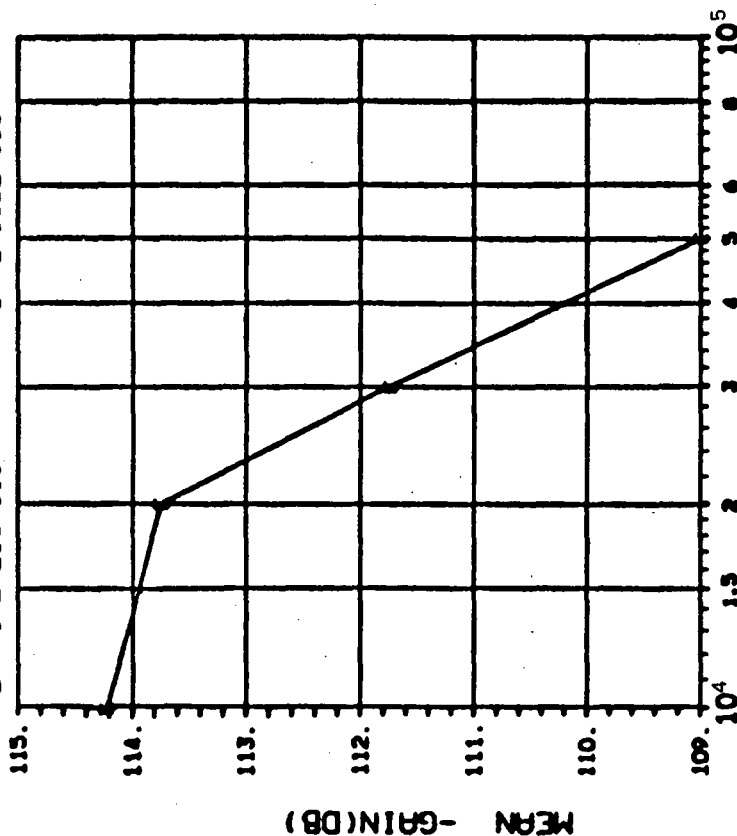


(4) +GAIN IN DB(1.MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------------|----------|
| CURVE | DOSE, kilorads(Si) | |
| | 10 | 20 30 50 |
| D | 1.00 9.923 9.201 9.381 8.516 | |

INITIAL MEAN VALUE +GAIN(DB) = $1.13 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP
 MFG: NSC 5 DEVICES TEST DATE 01-14-83
 REF: JPL LOG 0854 DATE CODE 008



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

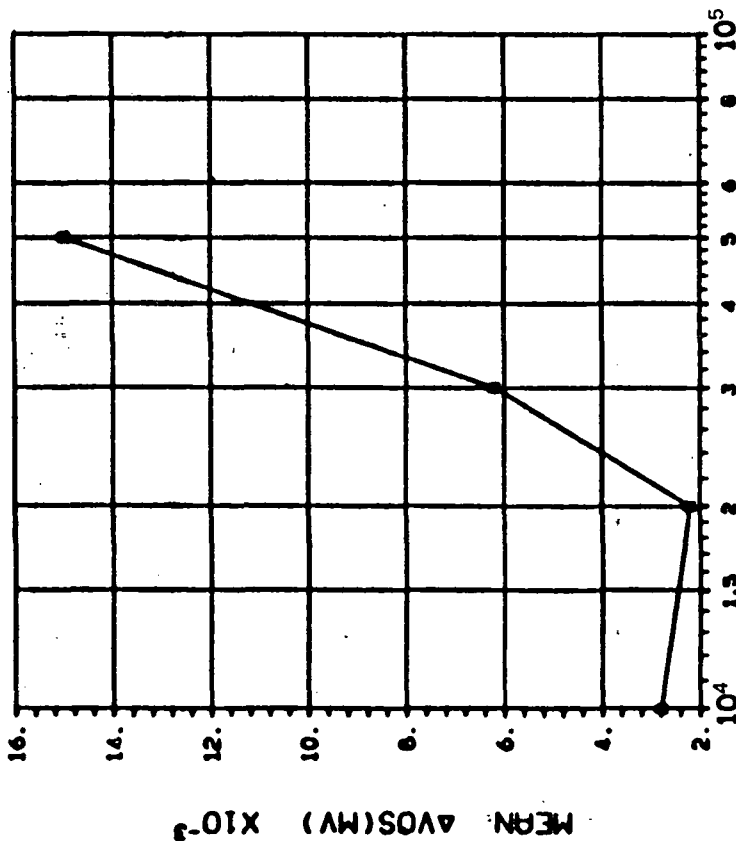
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------|--------------------|
| CURVE | I_L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 10 |
| | | 20 |
| | | 30 |
| | | 50 |
| | | 7.388 |
| | | 6.563 |
| | | 6.467 |
| | | |
| | | |

INITIAL MEAN VALUE -GAIN(DB) = $1.12 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-23-83

REF: JPL LOG 0855-1 DATE CODE 008



DOSE, rads(Si) Co 60 Gammas

(1) ΔVOS(MV): VS DOSE

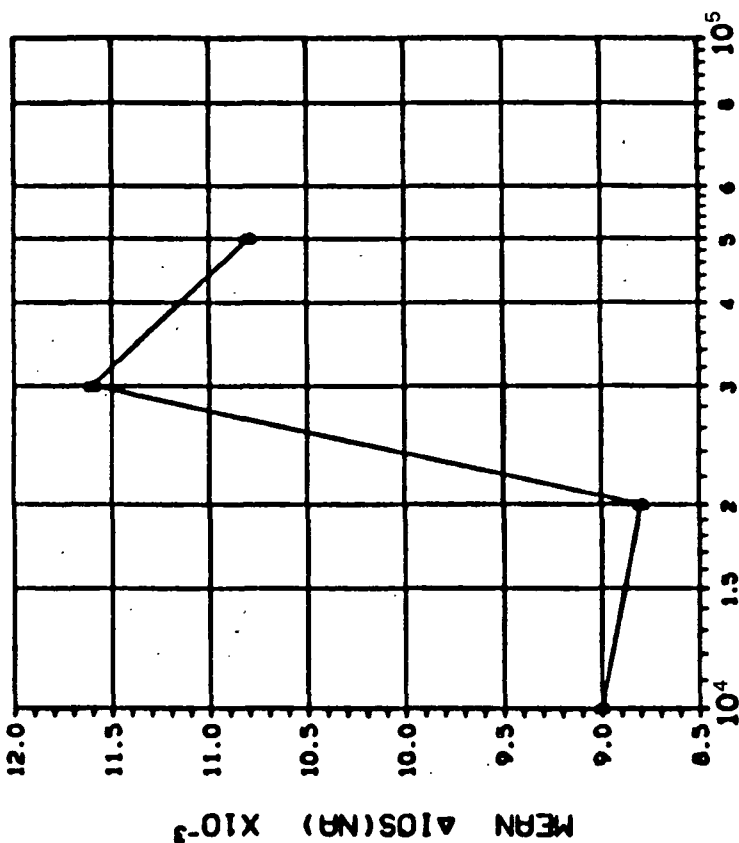
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 10 20 30 50 |
| A | .0032 .0030 .0043 .0186 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-23-83

REF: JPL LOG 0855-1 DATE CODE 008



DOSE, rads(Si) Co 60 Gammas

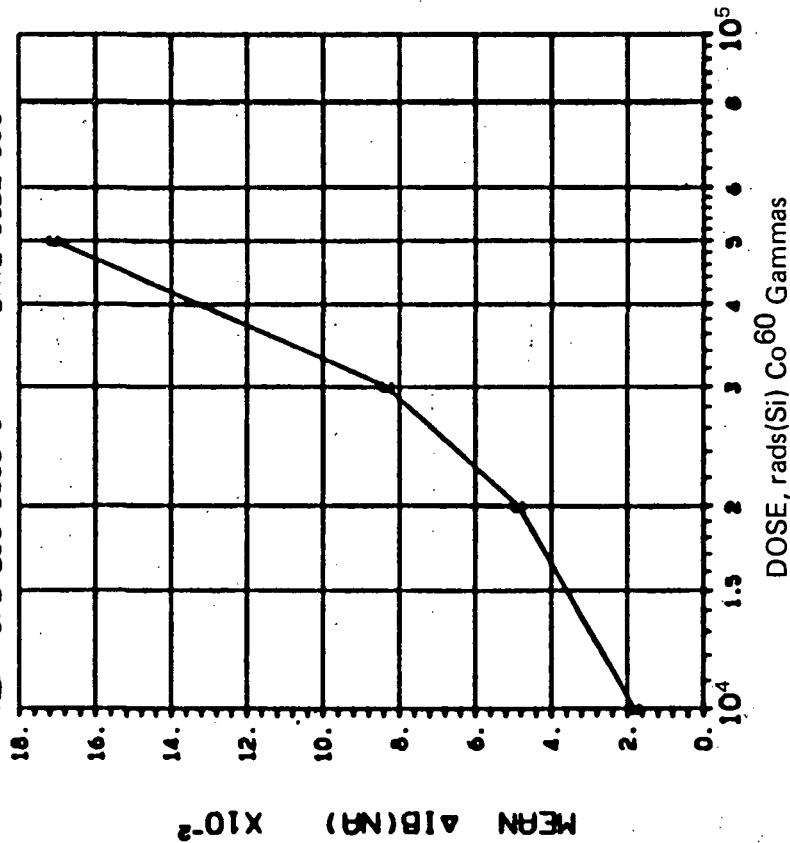
(2) ΔIOS(MV): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------|
| | 10 20 30 50 |
| B | .0055 .0060 .0100 .0098 |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-23-83
REF: JPL LOG 0855-1 DATE CODE 008

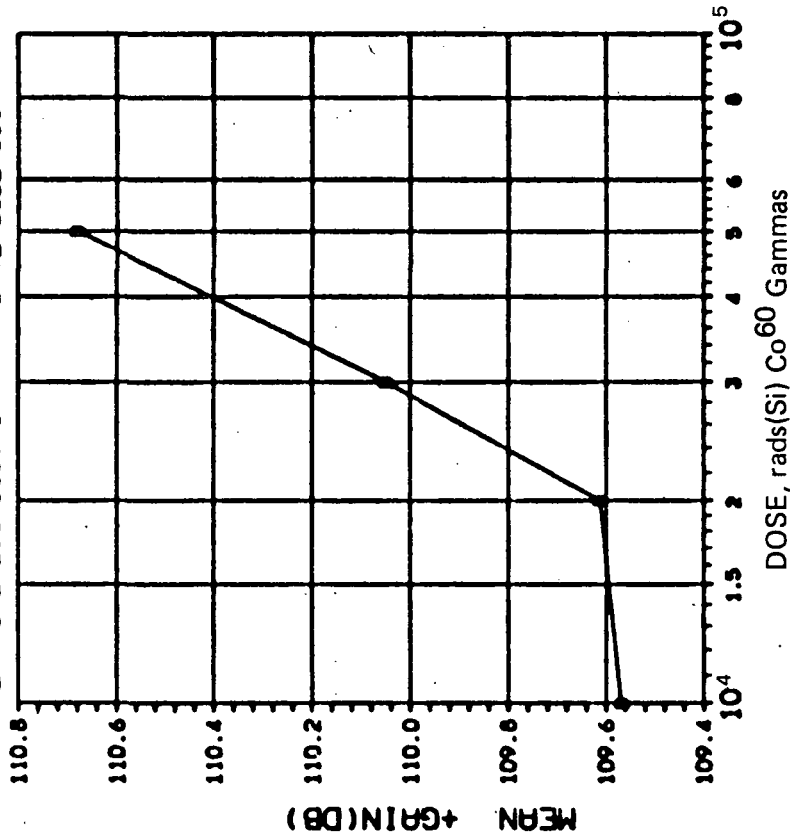


(3) ΔIB (NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------|
| CURVE | DOSE, kilorads(Si) | |
| C | 10 | .0307 |
| | 20 | .0623 |
| | 50 | .1477 |
| .2832 | | |

DEVICE TYPE: LM108 OP AMP

MFG: NSC 5 DEVICES TEST DATE 02-23-83
REF: JPL LOG 0855-1 DATE CODE 008

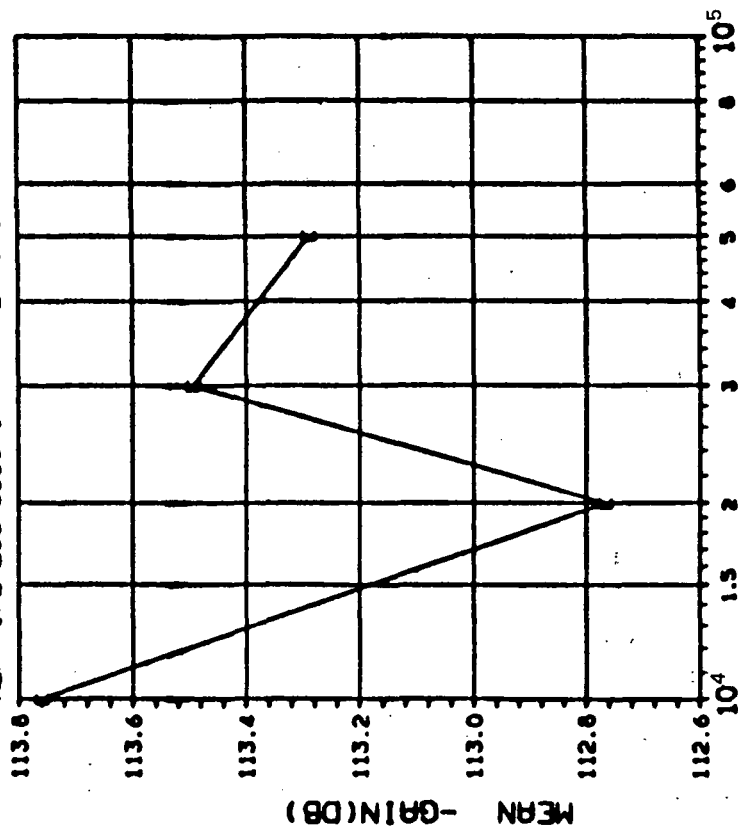


(4) +GAIN IN DB(1.1MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | | |
| | | 10 | 20 | 30 | 50 |
| D | 1.00 | 9.397 | 8.632 | 9.463 | 9.384 |

INITIAL MEAN VALUE +GAIN(DB) = 110.1412

DEVICE TYPE: LM108 OP AMP
 MFG: NSC 5 DEVICES TEST DATE 02-23-83
 REF: JPL LOG 0855-1 DATE CODE 008

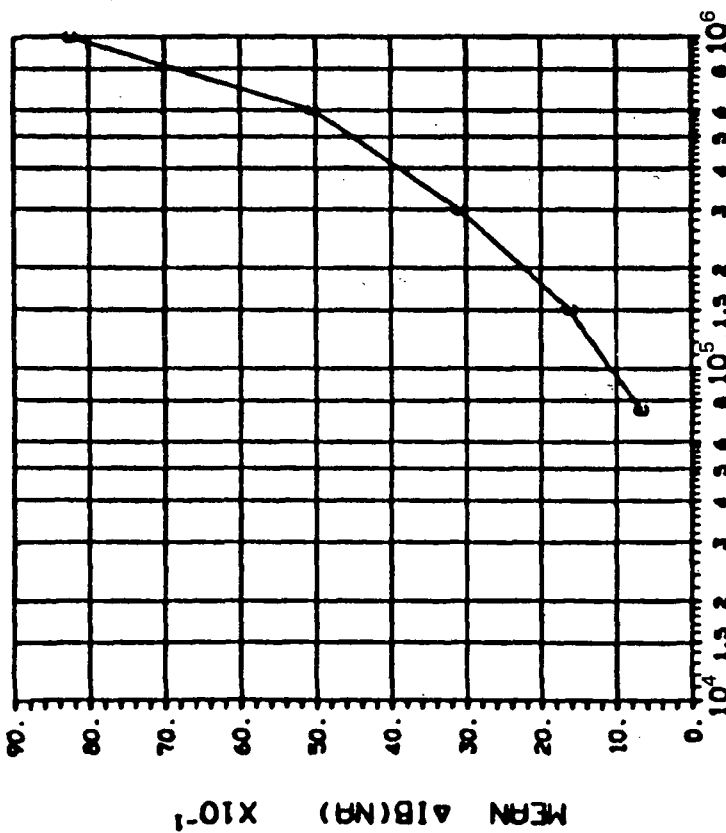


DOSE, rads(Si) Co⁶⁰ Gammas
 (5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|------------------------|--------------------|-------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | | |
| E | 1.00 | 10 | 20 | 30 |
| | | | | |
| | | | | |
| | | 5.903 | 8.785 | 6.766 |
| | | 6.748 | | |

INITIAL MEAN VALUE -GAIN(DB) = 1.12X10⁺²

DEVICE TYPE: LM108 OP AMP RADHARD
MFG: NSC 5 DEVICES TEST DATE 01-11-83
REF: JPL LOG 0630 DATE CODE

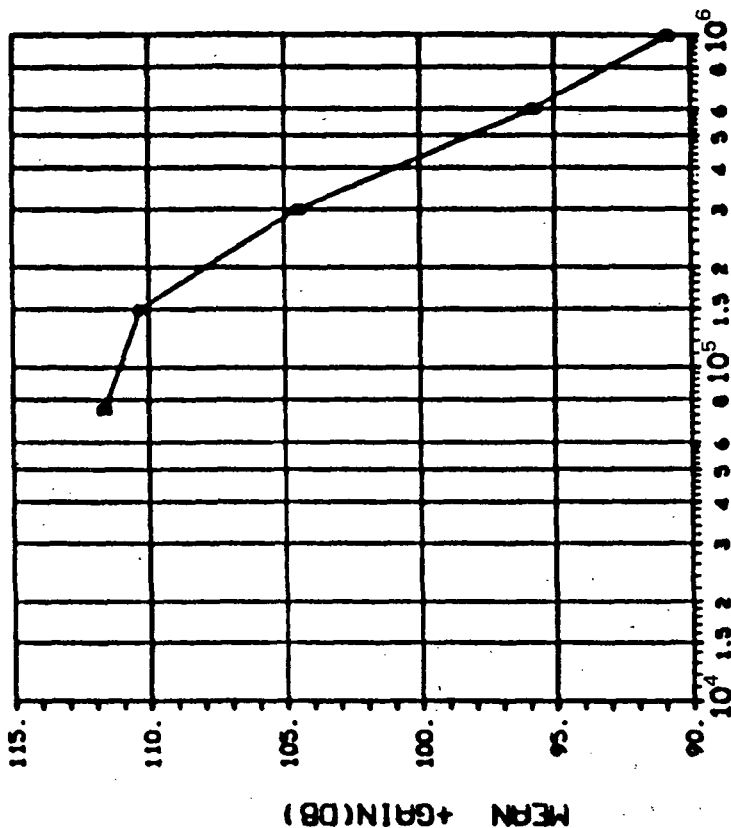


DOSE, rad(Si) 2.5 MeV electrons

(3) ΔIB (NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .1978 .3252 .6306 2.157 1.850 |

DEVICE TYPE: LM108 OP AMP RADHARD
MFG: NSC 5 DEVICES TEST DATE 01-11-83
REF: JPL LOG 0830 DATE CODE



DOSE, rad(Si) 2.5 MeV electrons

(4) $\Delta GAIN$ IN DB (1. MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | 3.892 6.853 5.323 4.341 4.423 |

INITIAL MEAN VALUE $\Delta GAIN$ (DB) = $1.14 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP RADHARD
 MFG: NSC 5 DEVICES TEST DATE 01-11-83
 REF: JPL LOG 0830 DATE CODE



DOSE, rads(Si) 2.5 MeV electrons
 (5)-GAIN IN DB(1.1MA LOAD, -10V): VS DOSE

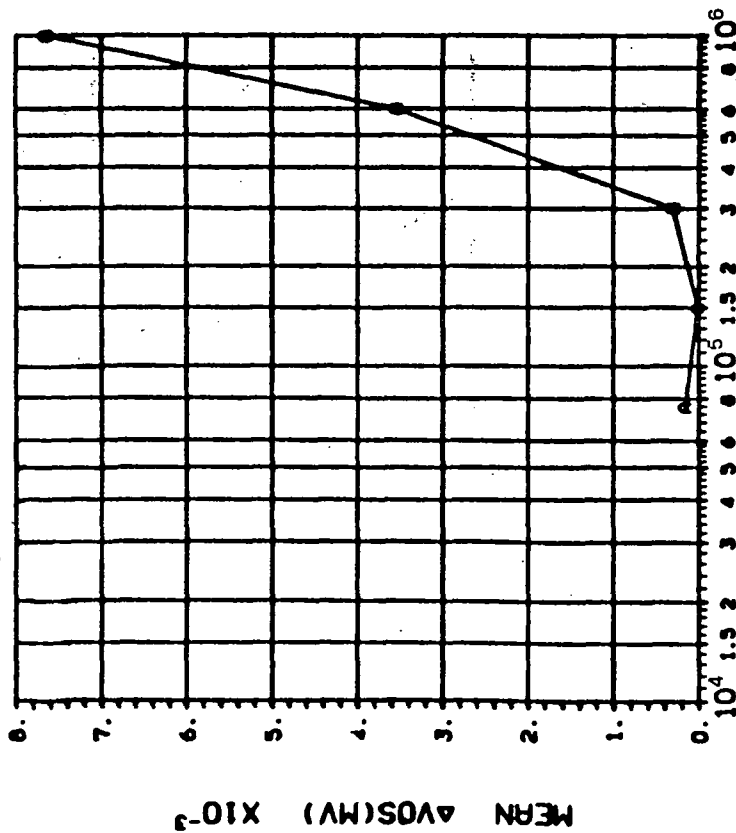
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 1000 |
| | | 7.005 11.90 5.056 6.703 5.356 |

INITIAL MEAN VALUE -GAIN(DB) = 1.15X10⁺²

DEVICE TYPE: LM106 OP AMP

MFG: PMI 4 DEVICES TEST DATE 01-11-83

REF: JPL LOG D832 DATE CODE 8224



DOSE, rads(Si) 2.5 MeV electrons

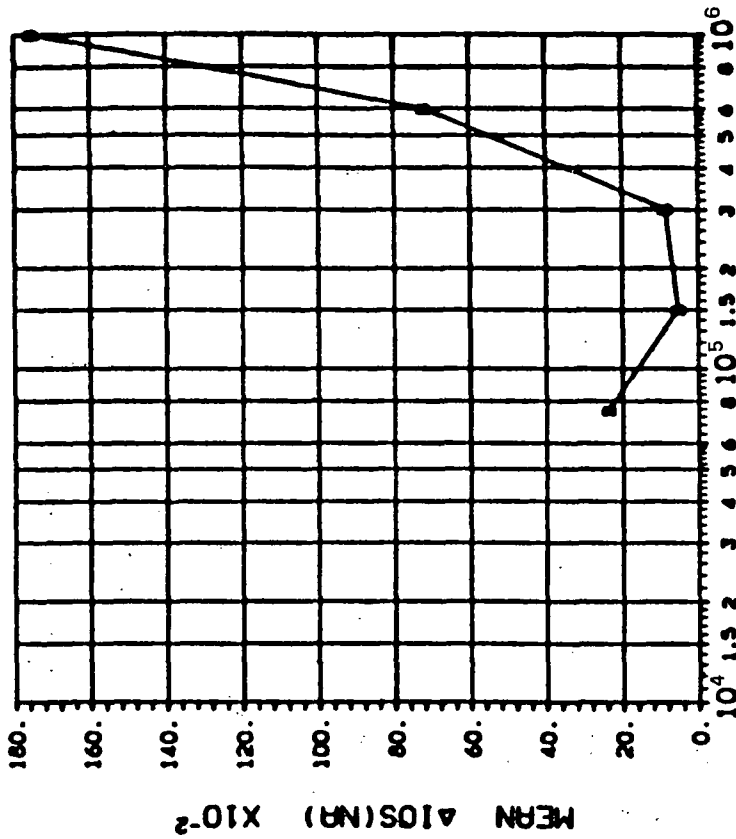
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------------|------|
| CURVE | DOSE, kilorads(Si) | |
| A | 75 | 300 |
| | 600 | 1000 |
| | .1439 .0902 .2614 3.176 6.272 | |

DEVICE TYPE: LM106 OP AMP

MFG: PMI 4 DEVICES TEST DATE 01-11-83

REF: JPL LOG 0832 DATE CODE 8224



DOSE, rads(Si) 2.5 MeV electrons

(2)ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|-------------------------------|------|
| CURVE | DOSE, kilorads(Si) | |
| B | 75 | 300 |
| | 600 | 1000 |
| | .1274 .0699 .0776 .4394 1.413 | |

DEVICE TYPE: LM108 OP AMP

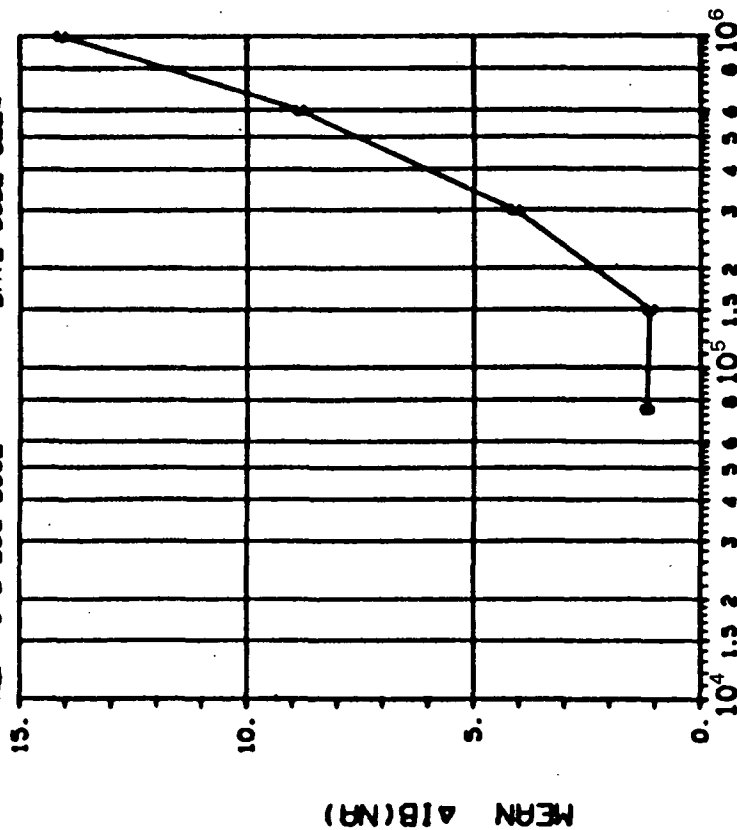
MFG: PMI

4 DEVICES

TEST DATE 01-11-83

REF: JPL LOG 0832

DATE CODE 8224



DOSE, rads(Si) 2.5 MeV electrons

(3) ΔIB (NA): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------------|
| | 75 150 300 600 1000 |
| C | 2.969 2.139 4.540 5.700 6.677 |

DEVICE TYPE: LM108 OP AMP

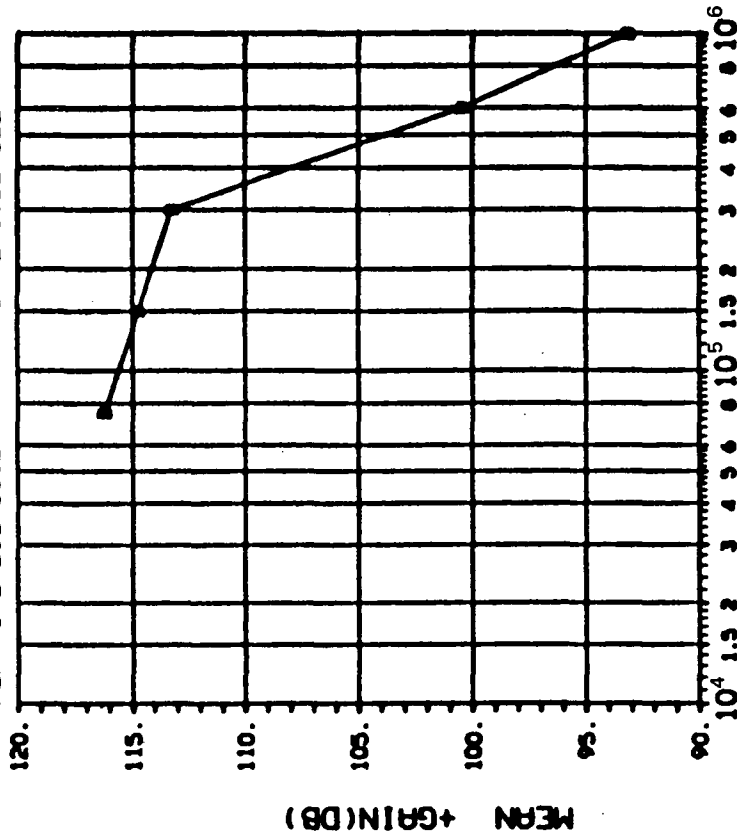
MFG: PMI

4 DEVICES

TEST DATE 01-11-83

REF: JPL LOG 0832

DATE CODE 8224



DOSE, rads(Si) 2.5 MeV electrons

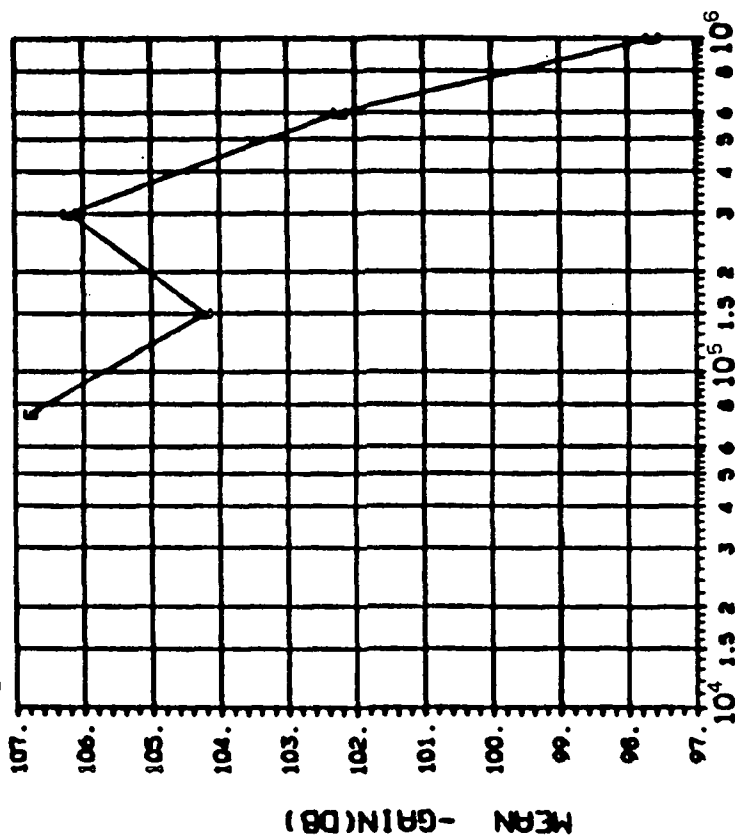
(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | I_L (mA) | DOSE, kilorads(Si) |
|-------|------------|-------------------------------|
| | | 75 150 300 600 1000 |
| D | 1.00 | 11.23 9.809 7.816 10.07 12.92 |

INITIAL MEAN VALUE +GAIN(DB) = $1.08 \times 10^{+2}$

DEVICE TYPE: LM108 OP AMP
 MFG: PMI 4 DEVICES TEST DATE 01-11-83
 REF: JPL LOG 0832 DATE CODE 8224



DOSE, rads(Si) 2.5 MeV electrons

(5)-GAIN IN DB(1.MA LOAD,-10V): VS DOSE

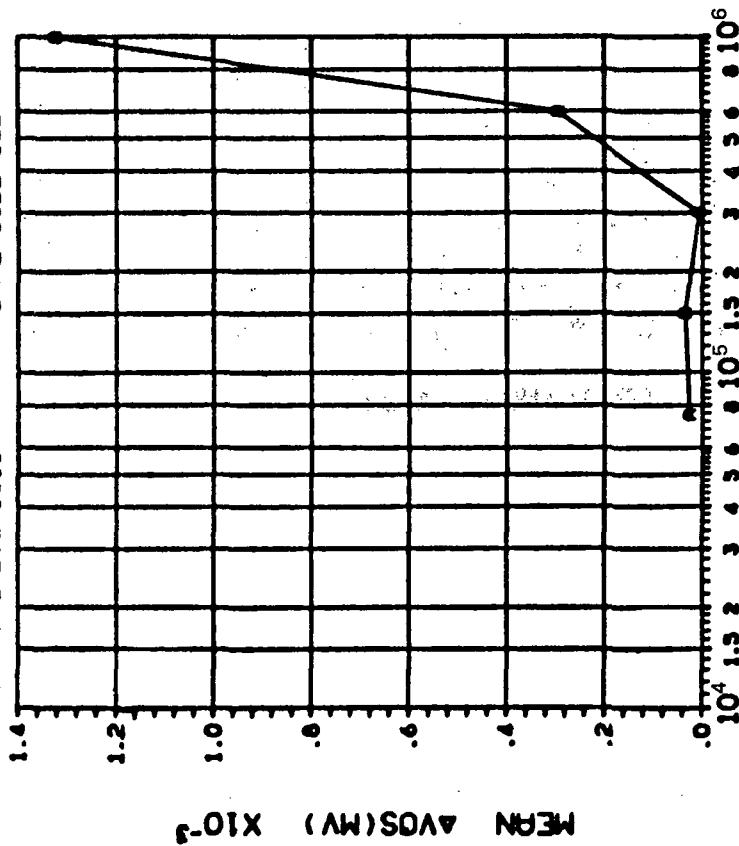
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 |
| | | 150 |
| | | 300 |
| | | 600 |
| | | 1000 |
| | | 8.297 5.780 4.919 5.943 6.654 |

INITIAL MEAN VALUE -GAIN(DB) = 1.15X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-01-83

REF: JPL LOG 0833 DATE CODE 8224



DOSE, rads(Si) Co 60 Gammas

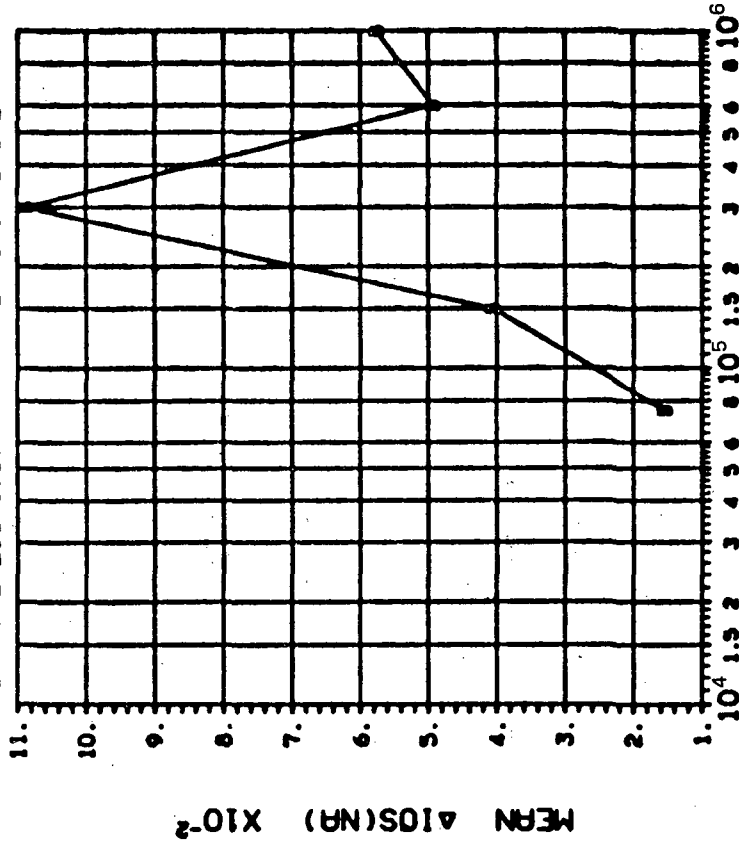
(1) ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | |
| | .1054 .1280 .1186 .4521 1.777 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-01-83

REF: JPL LOG 0833 DATE CODE 8224



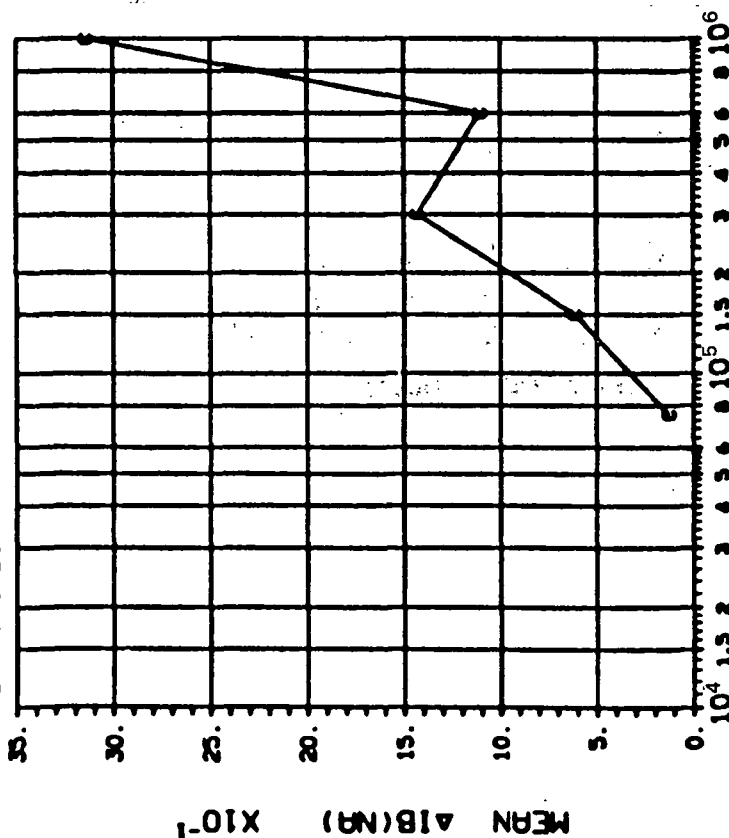
DOSE, rads(Si) Co 60 Gammas

(2) ΔIOS(NR): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | |
| | .0792 .1031 .1322 .1635 .1541 |

DEVICE TYPE: LM108 OP AMP
MFG: PMI 5 DEVICES
REF: JPL LOG 0833

TEST DATE 02-01-83
DATE CODE 8224



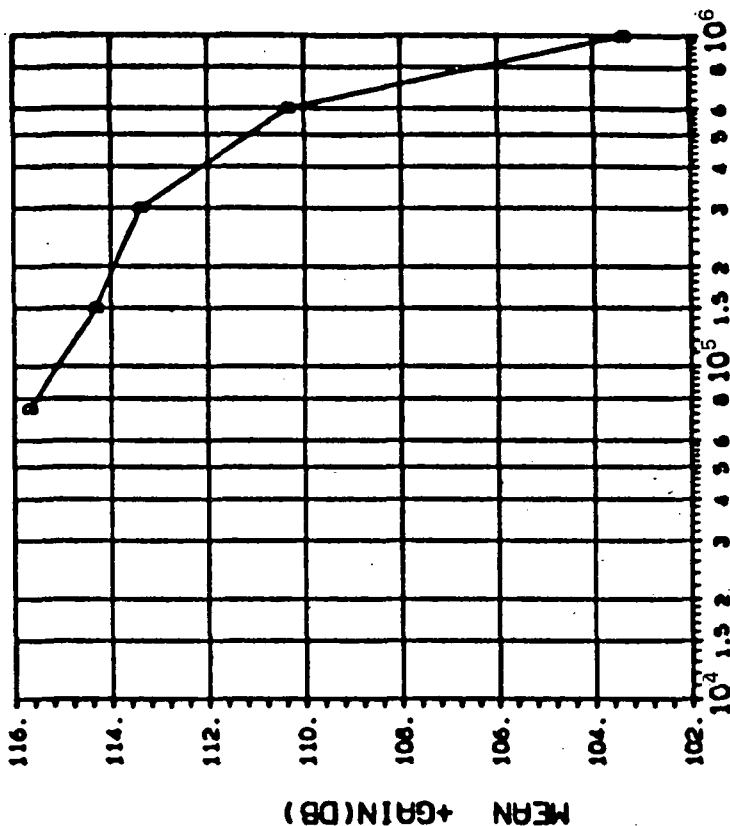
DOSE, rads(Si) Co⁶⁰ Gammas

(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 1000 |
| 2.791 3.116 3.671 3.074 4.666 | |

DEVICE TYPE: LM108 OP AMP
MFG: PMI 5 DEVICES
REF: JPL LOG 0833

TEST DATE 02-01-83
DATE CODE 8224



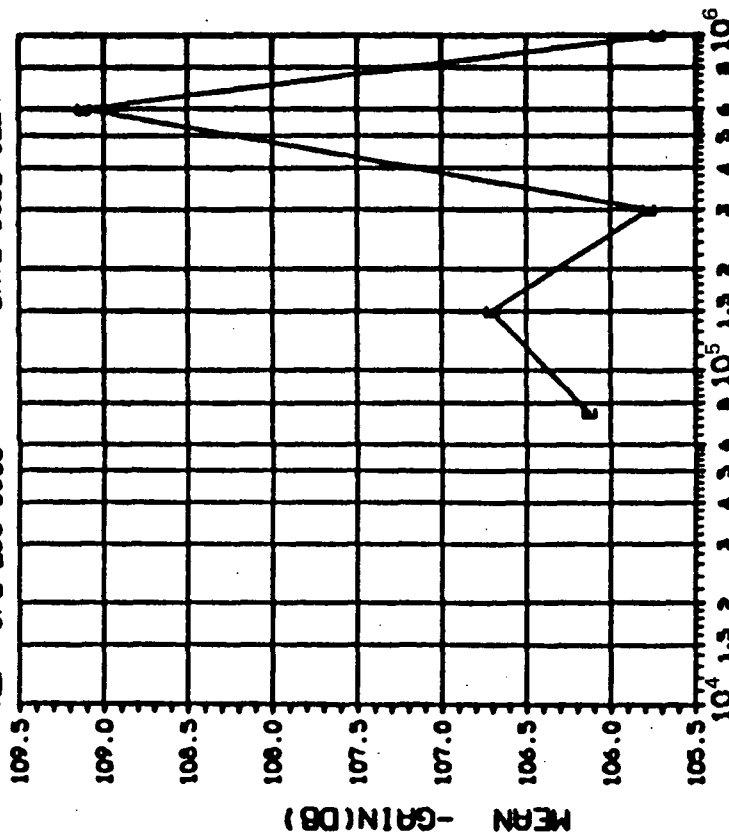
DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|--------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| | 1000 |
| 5.012 7.481 3.562 6.499 10.60 | |

INITIAL MEAN VALUE +GAIN(DB) = 1.24X10⁻²

DEVICE TYPE: LM108 OP AMP
 MFG: PHI 5 DEVICES TEST DATE 02-01-83
 REF: JPL LOG 0833 DATE CODE 8224



DOSE, rads(Si) Co 60 Gammas

(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

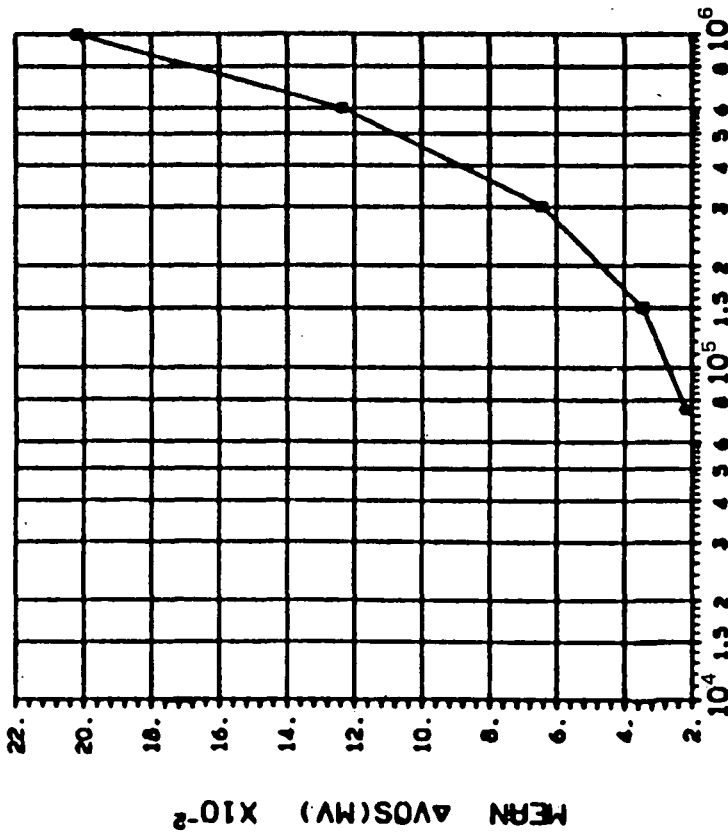
| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 1000 |
| | | 3.926 5.273 4.615 5.769 7.449 |

INITIAL MEAN VALUE -GAIN(DB) = 1.09X10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: PMI 4 DEVICES TEST DATE 02-03-83

REF: JPL LOG 0835 DATE CODE 8224



DOSE, rads(Si) Co⁶⁰ Gammas

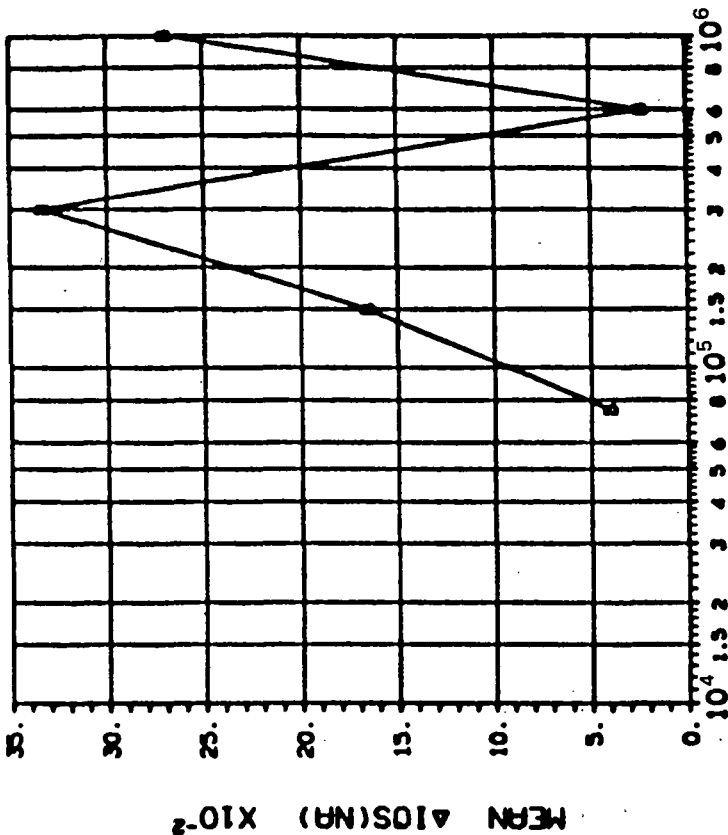
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .0336 .0458 .0609 .0340 .2892 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 4 DEVICES TEST DATE 02-03-83

REF: JPL LOG 0835 DATE CODE 8224



DOSE, rads(Si) Co⁶⁰ Gammas

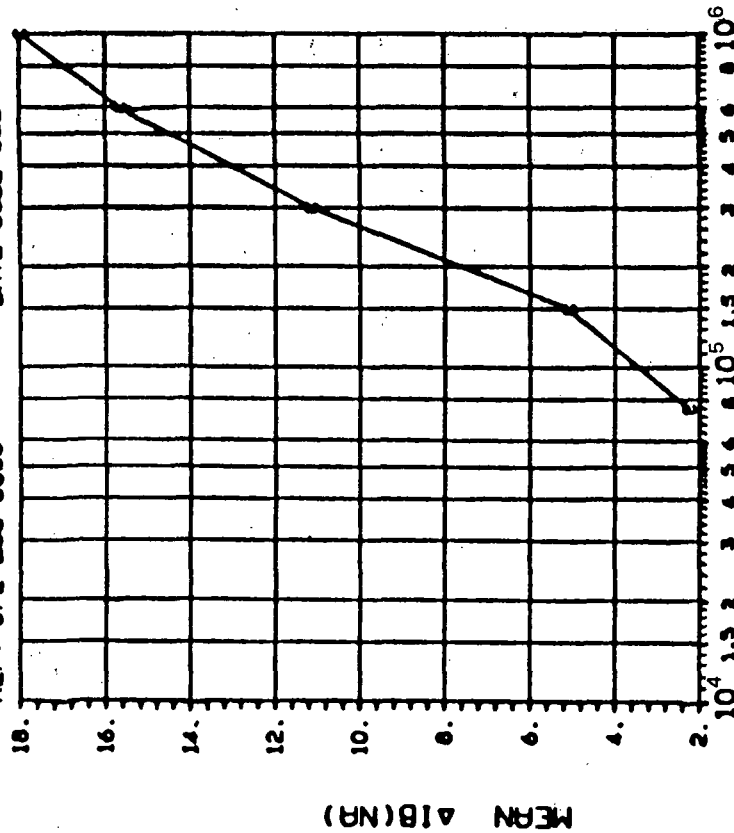
(2)ΔIOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .0431 .2072 .4660 .5476 .5014 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 4 DEVICES TEST DATE 02-03-83

REF: JPL LOG 0635 DATE CODE 8224



DOSE, rads(Si) Co⁶⁰ Gammas

(3)ΔIB(NA): VS DOSE

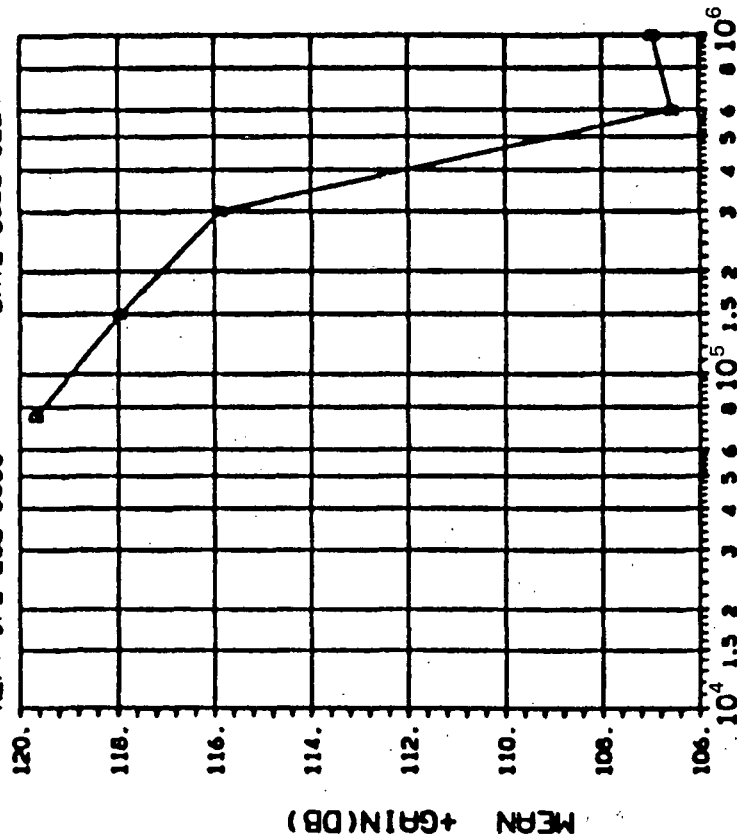
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------|-------------------------------|
| | 75 150 300 600 1000 |
| C | 1.055 2.845 6.743 10.42 11.64 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 4 DEVICES TEST DATE 02-03-83

REF: JPL LOG 0635 DATE CODE 8224



DOSE, rads(Si) Co⁶⁰ Gammas

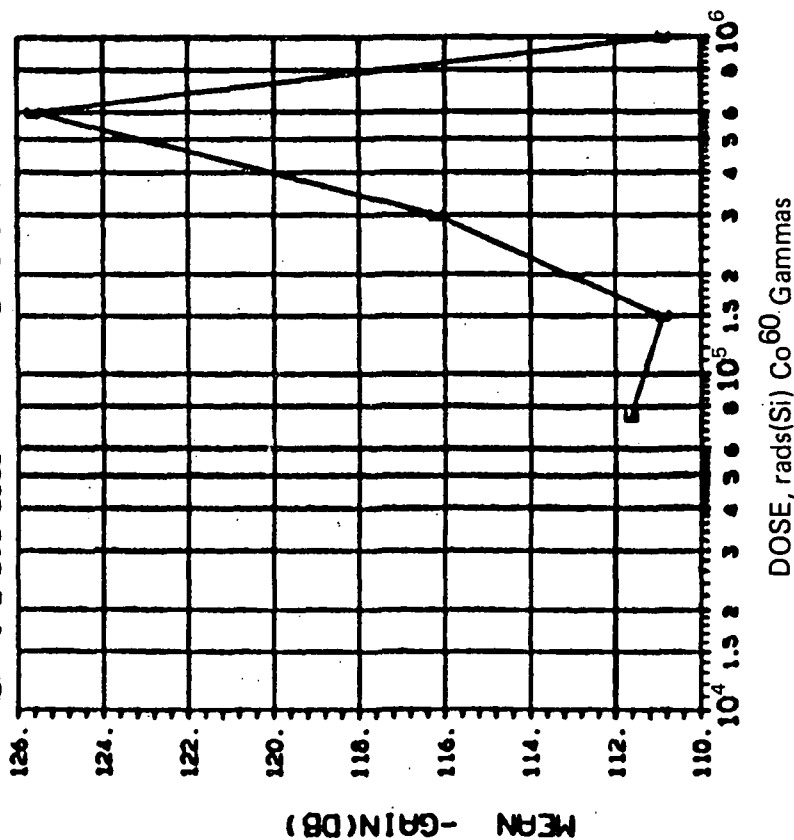
(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | I _L (mA) | DOSE, kilorads(Si) |
|-------|---------------------|-------------------------------|
| | | 75 150 300 600 1000 |
| D | 1.00 | 9.542 3.032 8.640 4.400 5.195 |

INITIAL MEAN VALUE +GAIN(DB) = 1.17X10¹²

DEVICE TYPE: LRI08 OP AMP
 MFG: PMI 4 DEVICES TEST DATE 02-03-83
 REF: JPL LOG 0635 DATE CODE 8224



(5)-GAIN IN DB(1.MA LOAO.-10V): VS DOSE

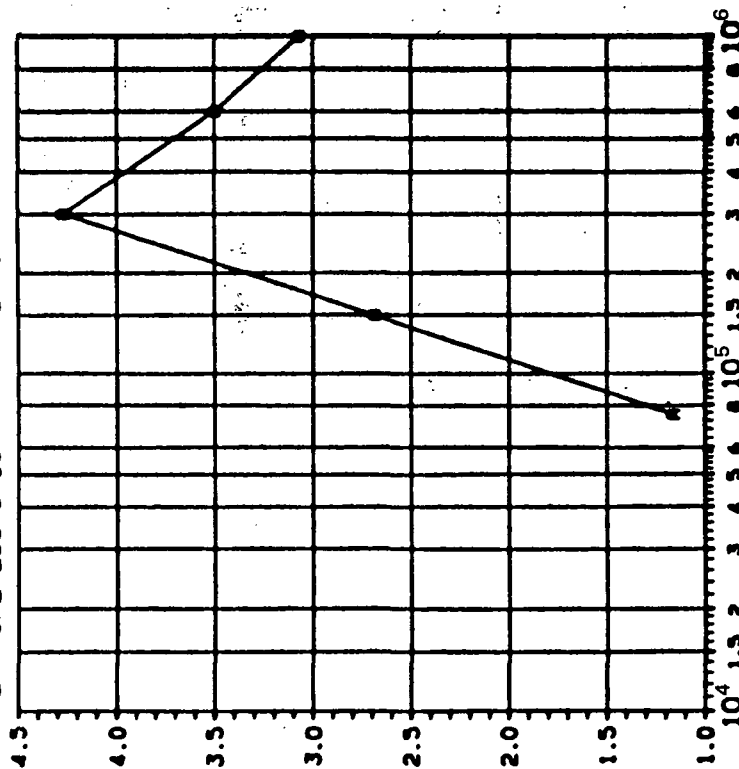
| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|-------------------------------|--|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| E | 1.00 | 75 150 300 600 1000 | |
| | | 7.184 6.165 6.899 7.159 2.918 | |

INITIAL MEAN VALUE -GAIN(DB) = 1.10x10⁺²

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-09-83

REF: JPL LOG 0955 DATE CODE E9774



DOSE, rads(Si) Co⁶⁰ Gammas

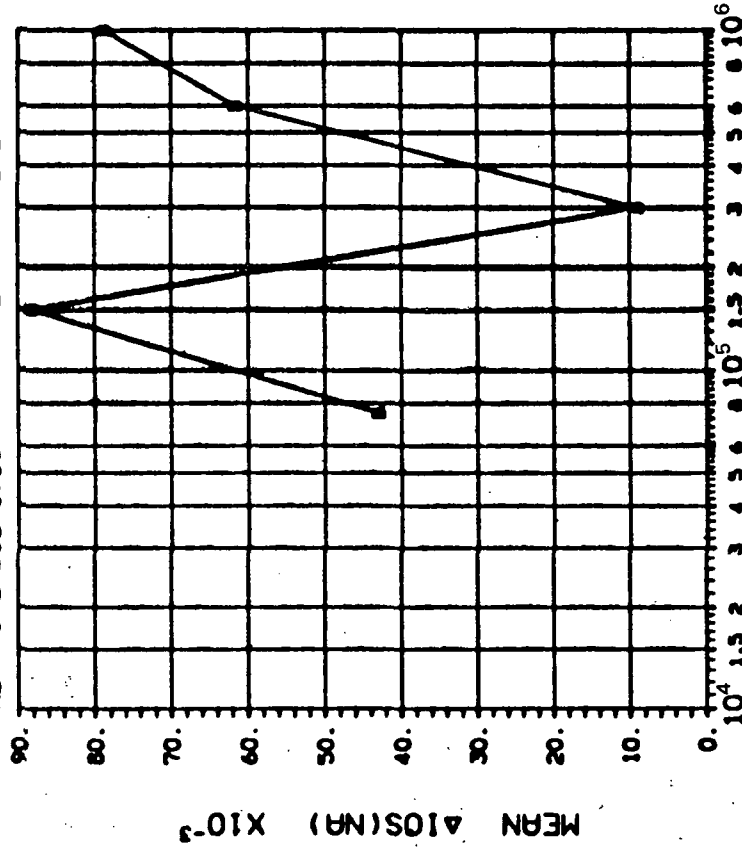
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .1586 .2727 .3836 .4371 .3811 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-09-83

REF: JPL LOG 0955 DATE CODE E9774



DOSE, rads(Si) Co⁶⁰ Gammas

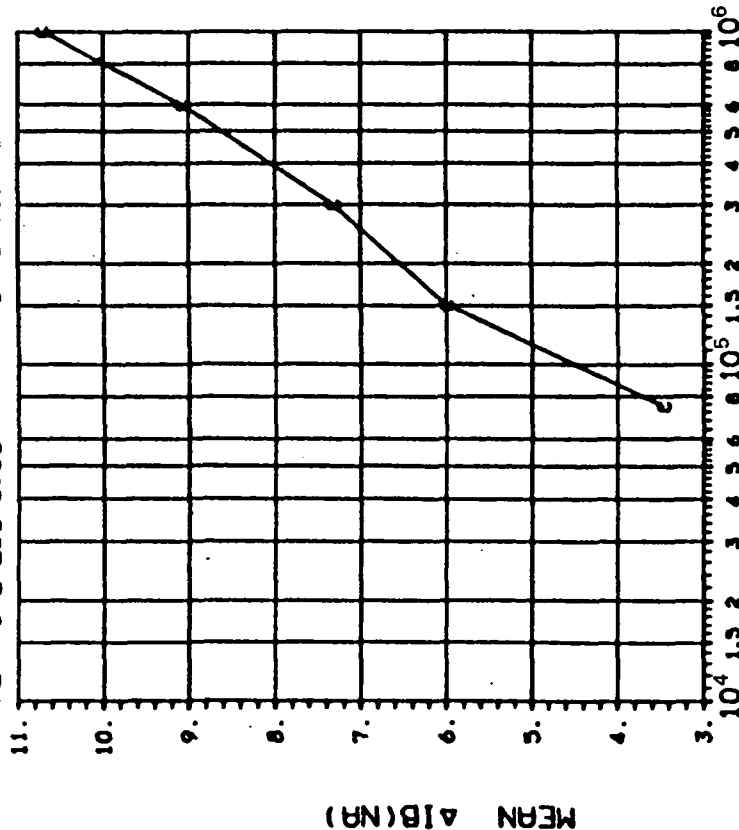
(2)ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .0798 .0917 .1767 .1934 .2226 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-09-83

REF: JPL LOG 0955 DATE CODE E9774



DOSE, rads(Si) Co⁶⁰ Gammas

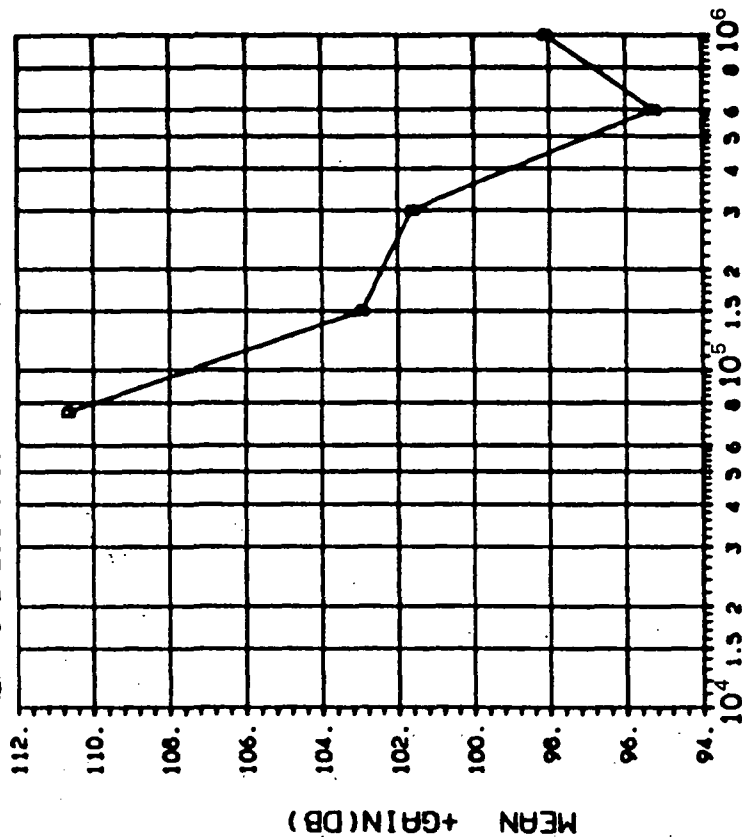
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | .5461 1.021 1.406 1.687 1.941 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-09-83

REF: JPL LOG 0955 DATE CODE E9774



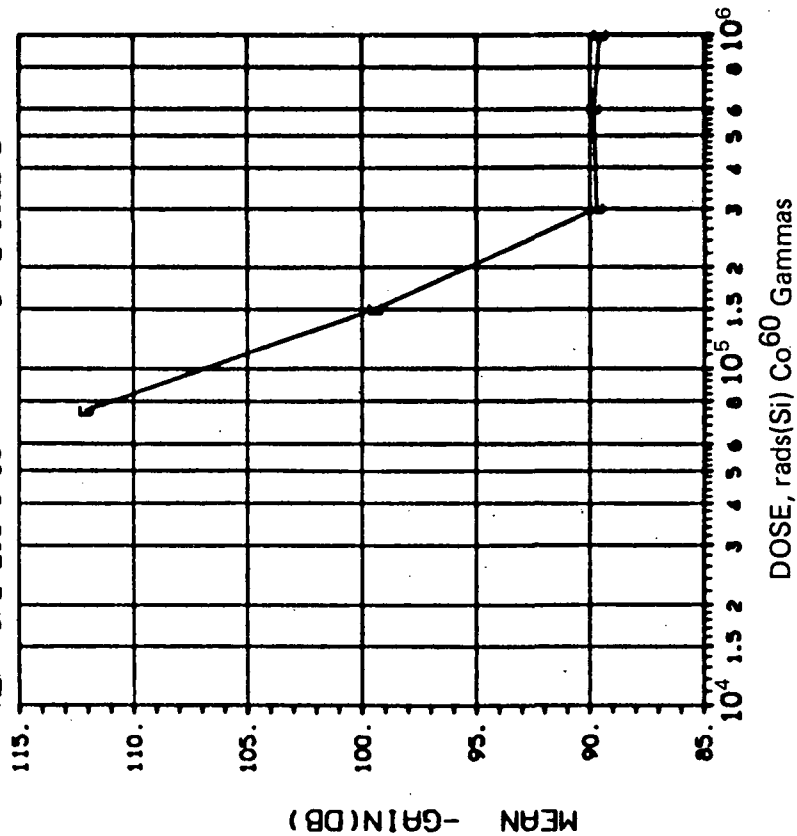
DOSE, rads(Si) Co⁶⁰ Gammas

(4)+GAIN IN DB(1.0MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| | 600 |
| | 1000 |
| | 4.449 5.294 11.87 7.480 9.670 |

INITIAL MEAN VALUE +GAIN(DB) = 1.28X10⁻²

DEVICE TYPE: LM108 OP AMP
 MFG: PMI 5 DEVICES TEST DATE 02-09-83
 REF: JPL LOG 0955 DATE CODE E9774

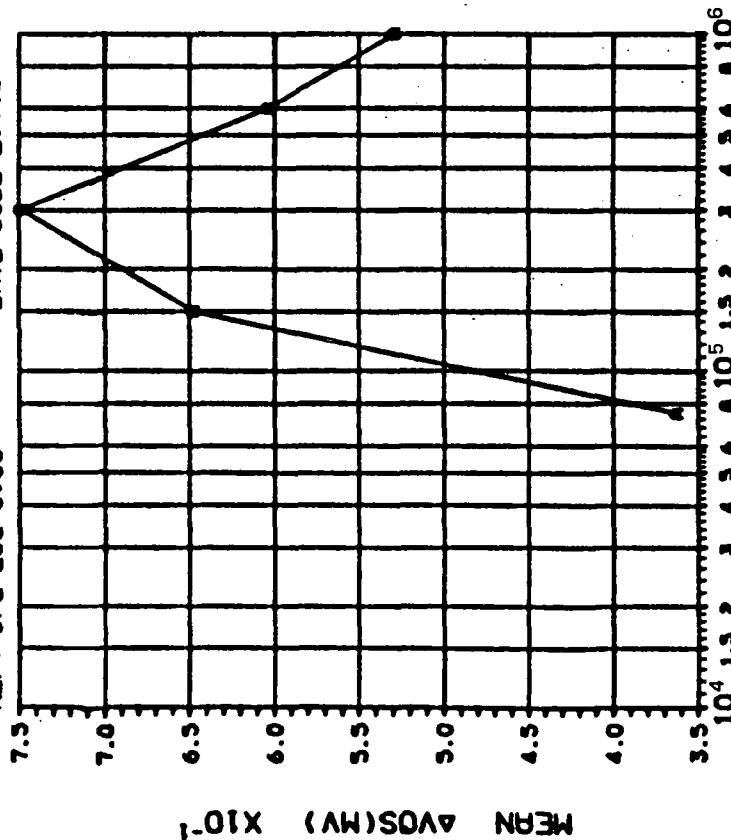


(5)-GAIN IN DB(1.0MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | |
|-------------------------------------|------------------------|--------------------|-------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) | |
| E | 1.00 | 75 | 150 |
| | | 300 | 600 |
| | | 1000 | |
| | | | |
| | | 6.568 | 4.390 |
| | | 2.008 | 5.237 |
| | | 2.784 | |

INITIAL MEAN VALUE -GAIN(DB) = $1.13 \times 10^{+2}$

MFG: PMI 5 DEVICES TEST DATE 01-14-83
REF: JPL LOG 0956 DATE CODE E9774



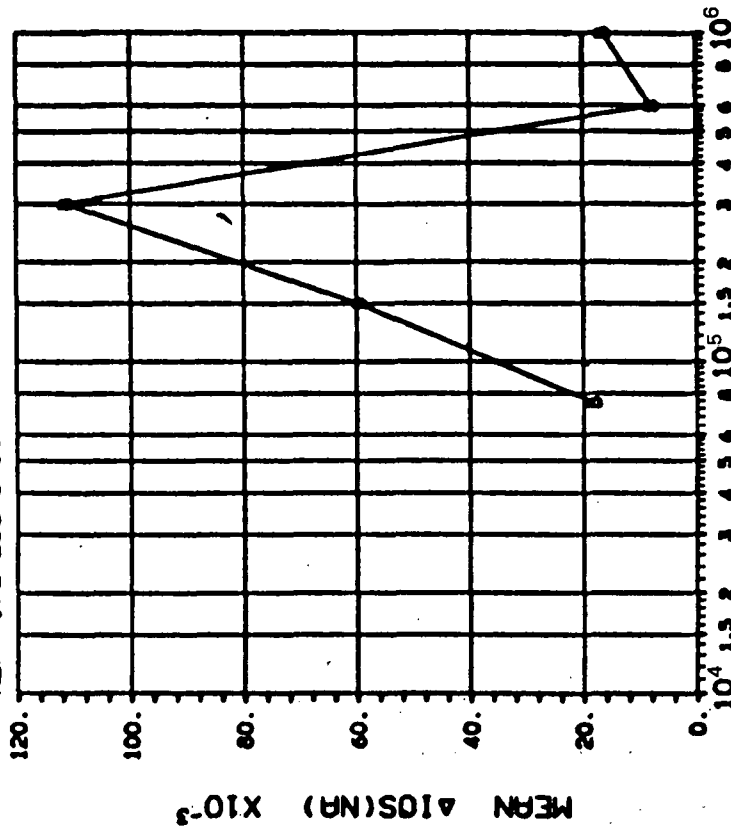
DOSE, rads(Si) 2.5 MeV electrons

(1) $\Delta VOS(MV)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 75 | 150 | 300 | 600 1000 |
| A | .4826 | .6984 | .7822 | .8439 .7848 |

DEVICE TYPE: LM108 DP AMP

MFG: PMI 5 DEVICES TEST DATE 01-14-83
REF: JPL LOG 0956 DATE CODE E9774

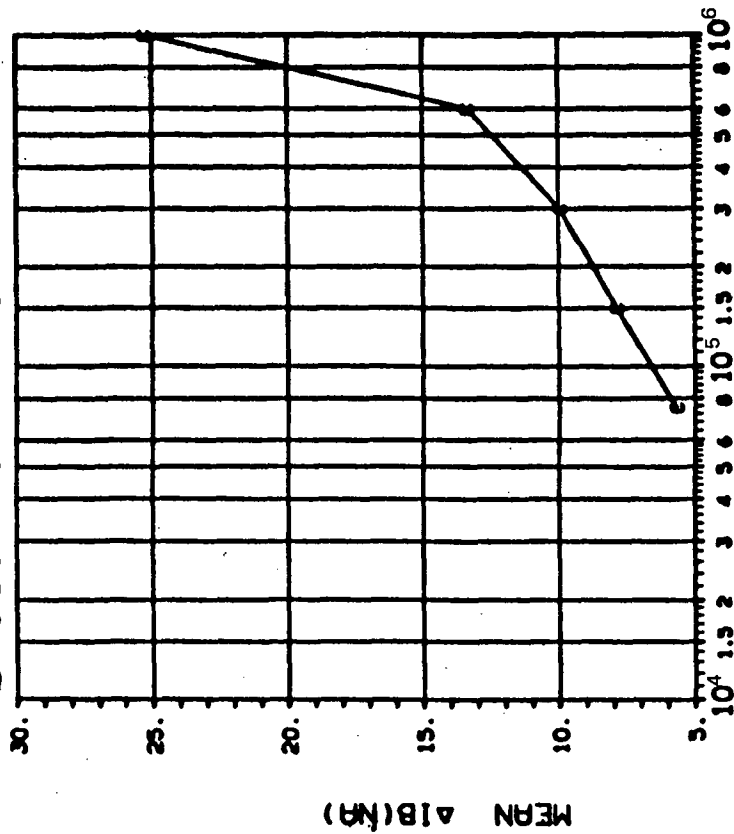


DOSE, rads(Si) 2.5 MeV electrons

(2) $\Delta \text{IOS(NA)}$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 75 | 150 | 300 | 600 |
| B | .0958 | .1741 | .2036 | .3069 |
| | | | | .3277 |

DEVICE TYPE: LM108 OP AMP
 MFG: PMI 5 DEVICES TEST DATE 01-14-83
 REF: JPL LOG 0956 DATE CODE E9774



DOSE, rads(Si) 2.5 MeV electrons

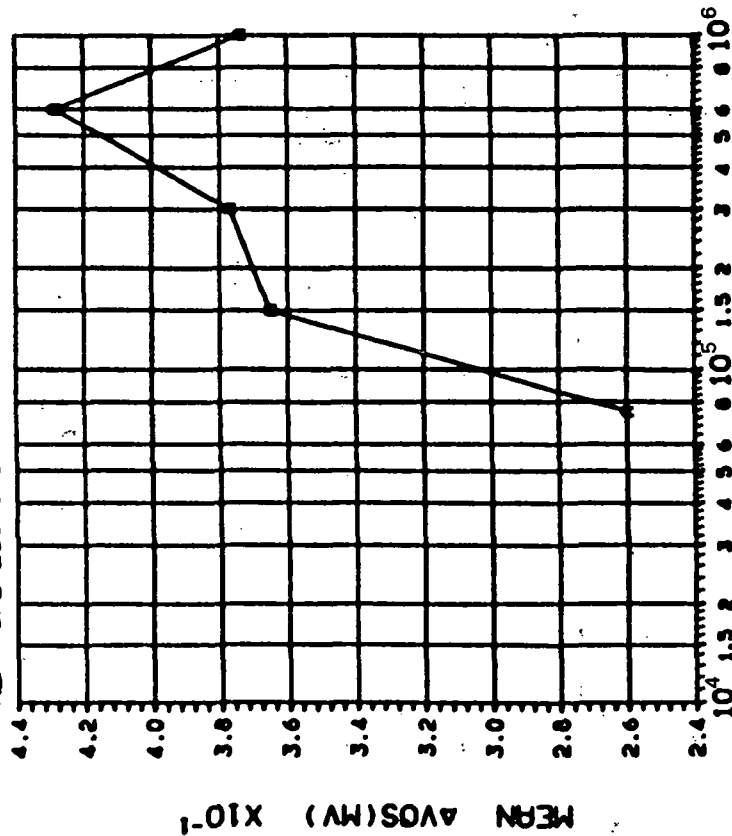
(3) $\Delta IB(NA)$: VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | | | |
|-------------------------------------|--------------------|-------|-------|-------|
| CURVE | DOSE, kilorads(Si) | | | |
| | 75 | 150 | 300 | 1000 |
| C | 1.276 | 2.167 | 3.097 | 5.087 |
| | 2.167 | 3.097 | 5.087 | 16.21 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI TEST DATE 01-17-83

REF: JPL LOG 0957 DATE CODE E9974



DOSE, rads(Si) 2.5 MeV electrons

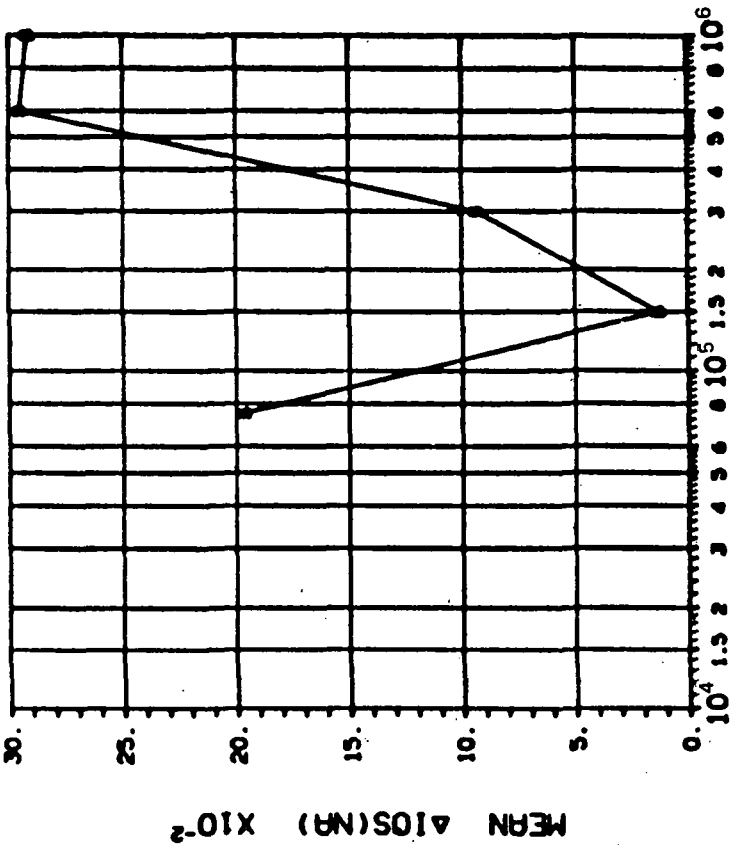
(1)ΔVOS(MV): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| A | .75 |
| | 150 |
| | 300 |
| | 1000 |
| | |
| | .2968 .2675 .2597 .2435 .3255 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI TEST DATE 01-17-83

REF: JPL LOG 0957 DATE CODE E9974



DOSE, rads(Si) 2.5 MeV electrons

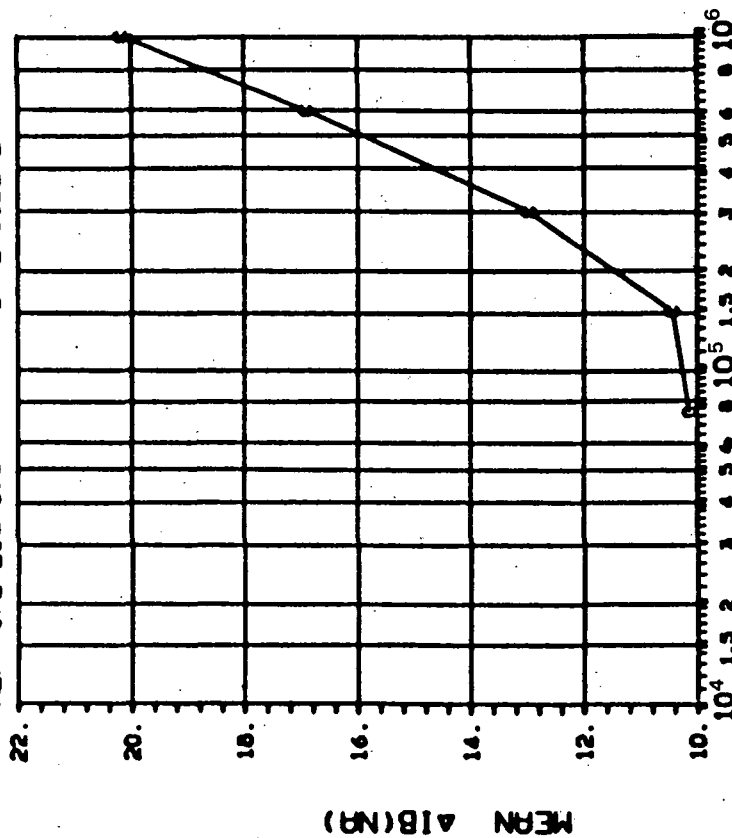
(2)ΔIOS(MA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| B | .75 |
| | 150 |
| | 300 |
| | 1000 |
| | |
| | .2106 .1860 .2259 .4796 .4208 |

DEVICE TYPE: LM108 OP AMP

MFG: PHI 5 DEVICES TEST DATE 01-17-83

REF: JPL LOG 0957 DATE CODE E9974



DOSE, rads(Si) 2.5 MeV electrons

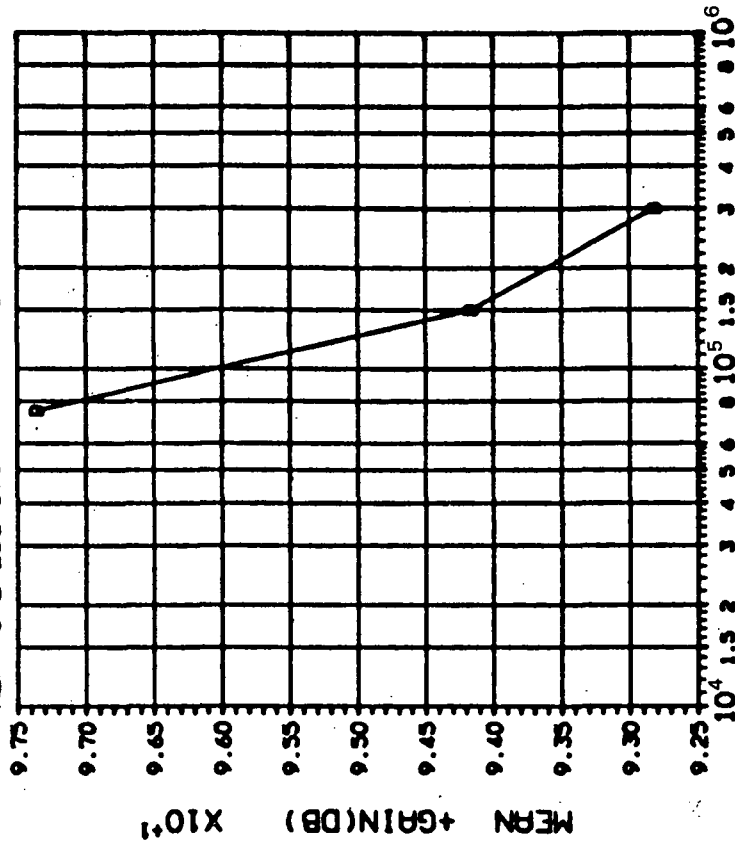
(3)ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| C | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | .5842 .5841 .6137 1.210 1.519 |

DEVICE TYPE: LM108 OP AMP

MFG: PHI 5 DEVICES TEST DATE 01-17-83

REF: JPL LOG 0957 DATE CODE E9974



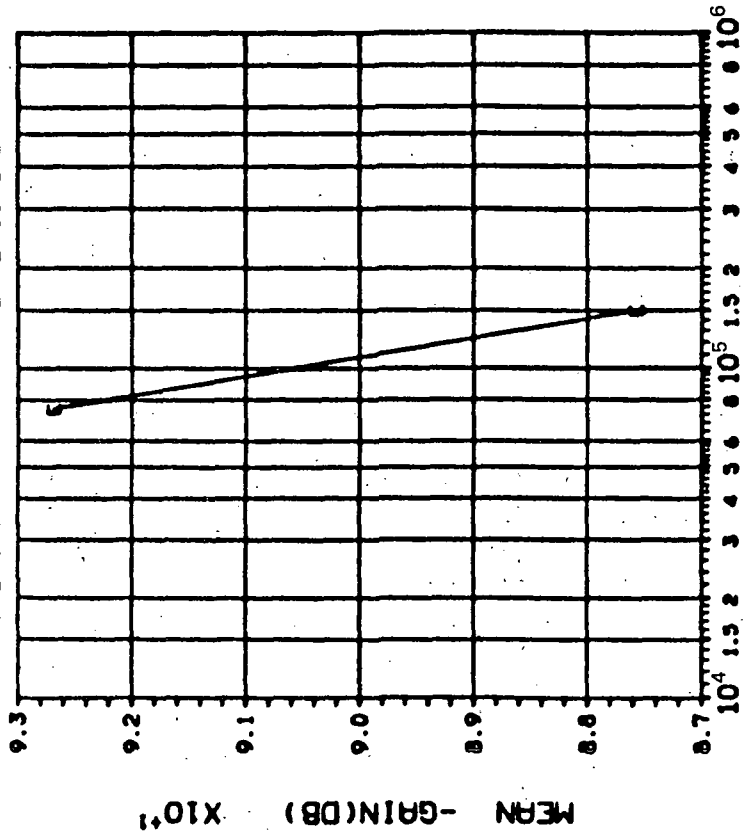
DOSE, rads(Si) 2.5 MeV electrons

(4)+GAIN IN DB(1.MA LOAD,+10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | |
|-------------------------------------|-------------------------------|
| CURVE | DOSE, kilorads(Si) |
| D | 75 |
| | 150 |
| | 300 |
| | 1000 |
| | 2.515 .5099 1.062 ##### ##### |

INITIAL MEAN VALUE +GAIN(DB) = 1.26X10^-9

DEVICE TYPE: LM108 OP AMP
 MFG: PMI 5 DEVICES TEST DATE 01-17-83
 REF: JPL LOG 0957 DATE CODE E9974



(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|---------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 1000 |
| | | 2.569 2.469 ***** |

INITIAL MEAN VALUE -GAIN(DB) = 1.11X10⁺²

DEVICE TYPE: LM108 OP AMP

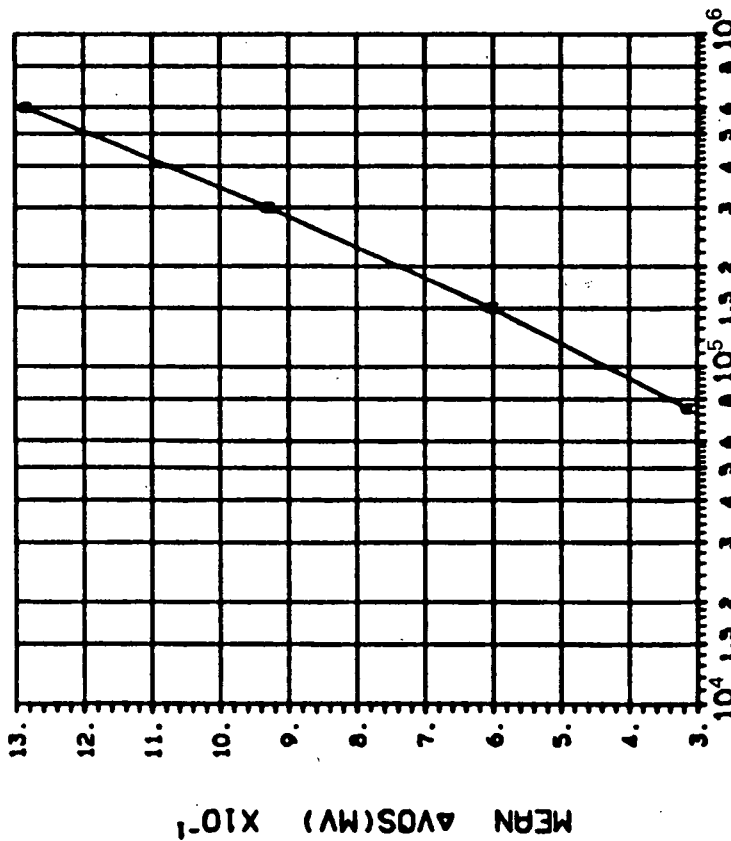
MFG: PMI

5 DEVICES

TEST DATE 02-14-83

REF: JPL LOG 0958

DATE CODE E9774



DOSE, rads(Si) Co 60 Gammas

(1) $\Delta VOS(MV)$: VS DOSE

TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------------------------|--------------------|
| A | 75 |
| | 150 |
| | 300 |
| | 600 |
| .3894 .6828 .9598 1.657 | |

DEVICE TYPE: LM108 OP AMP

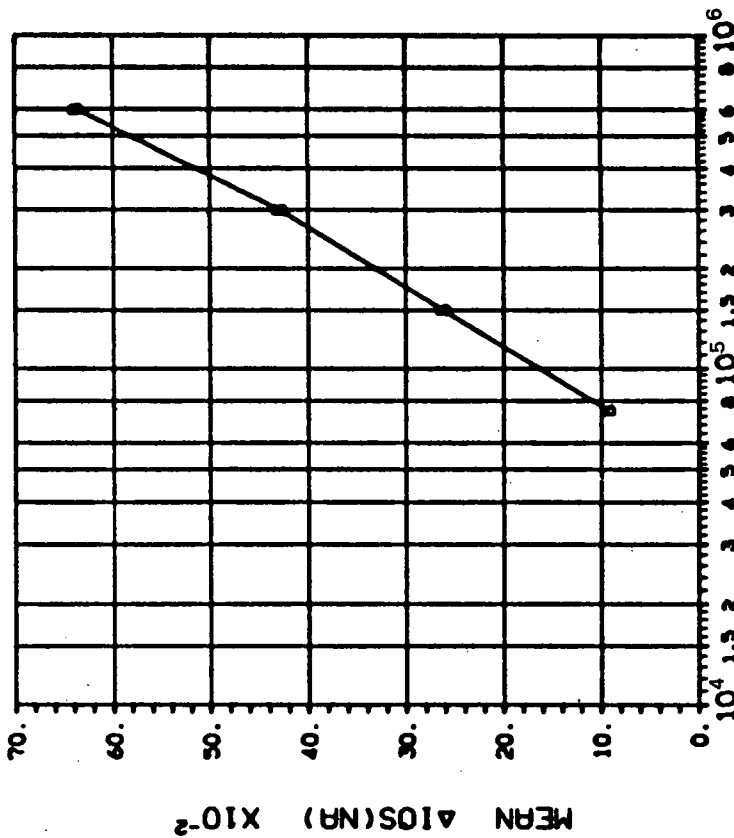
MFG: PMI

5 DEVICES

TEST DATE 02-14-83

REF: JPL LOG 0958

DATE CODE E9774



DOSE, rads(Si) Co 60 Gammas

(2) $\Delta IOS(NR)$: VS DOSE

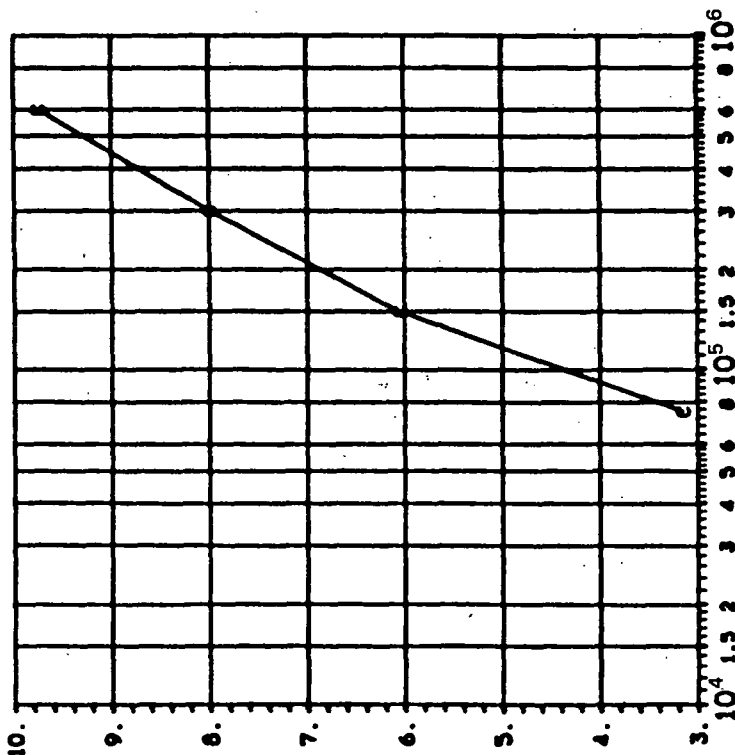
TABLE OF NORMAL STANDARD DEVIATIONS

| CURVE | DOSE, kilorads(Si) |
|-------------------------|--------------------|
| B | 75 |
| | 150 |
| | 300 |
| | 600 |
| .0924 .3399 .4632 .8504 | |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-14-83

REF: JPL LOG 0958 DATE CODE E9774



DOSE, rads(Si) Co⁶⁰ Gammas

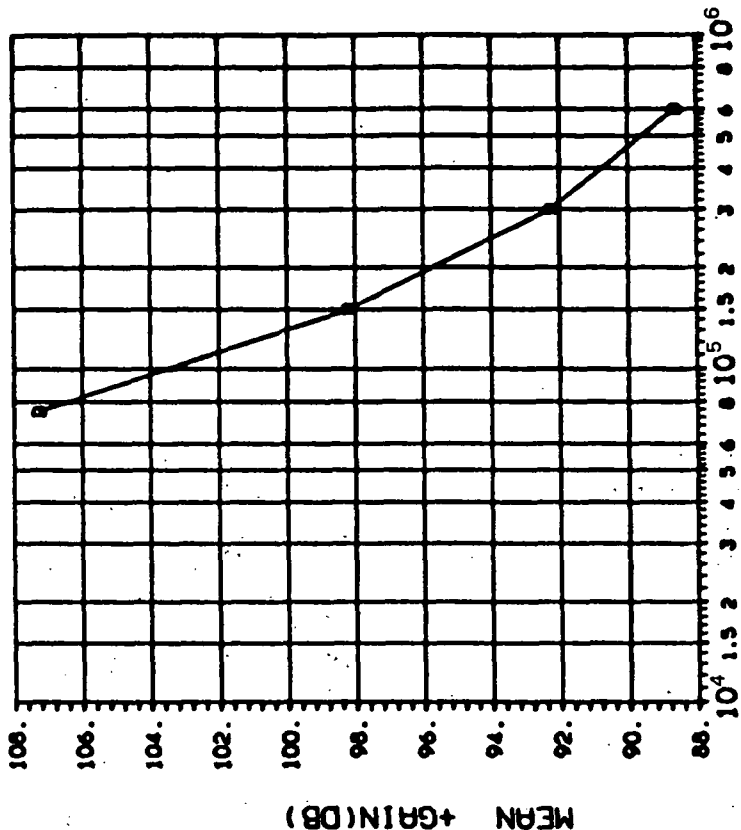
(3) ΔIB(NA): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|--------------------|-------------------|
| CURVE | DOSE, kilorads(Si) | |
| | 75 | 300 600 |
| C | .4069 | 1.116 1.933 2.243 |

DEVICE TYPE: LM108 OP AMP

MFG: PMI 5 DEVICES TEST DATE 02-14-83

REF: JPL LOG 0958 DATE CODE E9774



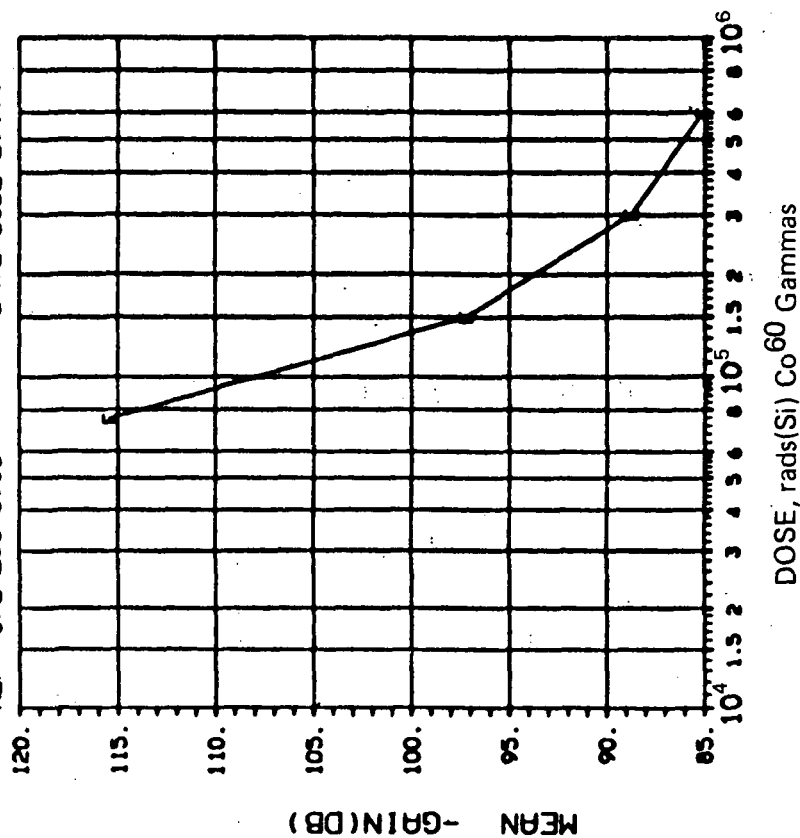
DOSE, rads(Si) Co⁶⁰ Gammas

(4) +GAIN IN DB(1.1MA LOAD, +10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|---------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| | | 75 150 300 600 |
| D | 1.00 | 7.307 3.429 3.226 3.683 |

INITIAL MEAN VALUE +GAIN(DB) = 1.33 × 10¹²

DEVICE TYPE: LM108 OP AMP
 MFG: PMI 5 DEVICES TEST DATE 02-14-83
 REF: JPL LOG 0958 DATE CODE E9774



(5)-GAIN IN DB(1.MA LOAD, -10V): VS DOSE

| TABLE OF NORMAL STANDARD DEVIATIONS | | |
|-------------------------------------|------------------------|-------------------------|
| CURVE | I _L (mA) | DOSE, kilorads(Si) |
| E | 1.00 | 75 150 300 600 |
| | | 15.26 7.283 5.818 9.037 |

INITIAL MEAN VALUE -GAIN(DB) = 1.17X10⁺²

APPENDIX A

VENDOR IDENTIFICATION CODE LIST

VENDOR IDENTIFICATION CODE LIST

| | |
|-----|---|
| ADI | Analog Devices, Inc. |
| ALP | Alpha Industries, Semiconductor Division |
| AMD | Advanced Microdevices Corporation |
| AMP | Amptek, Inc. |
| BUB | Burr-Brown |
| FSC | Fairchild Semiconductor |
| HAR | Harris Corporation, Semiconductor Division |
| HUG | Hughes Aircraft Co., Solid State Prod. |
| LTC | Linear Technology, Inc. |
| MNC | Micro Networks Corporation |
| MOT | Motorola, Inc., Semiconductor Products Division |
| MPS | Micro Power Systems, Inc. |
| MTL | Mitel Semiconductor |
| NSC | National Semiconductor Corporation |
| PMI | Precision Monolithics, Inc. |
| RAY | Ratheon Co., Semiconductor Division |
| RCA | RCA Corporation, Solid State Division |
| SIL | Siliconix Devices, Inc. |
| SPI | Semi Processes, Inc. |
| SSS | Solid State Scientific |
| STX | Supertex, Inc. |

APPENDIX B

INTEGRATED CIRCUIT ELECTRICAL PARAMETER
SYMBOLS AND ABBREVIATIONS

INTEGRATED CIRCUIT ELECTRICAL PARAMETER SYMBOLS AND ABBREVIATIONS

| | |
|-----------------------|--|
| AOL ERR | Gain error |
| AOL OFF | Offset gain |
| +AV | Positive voltage gain |
| -AV | Negative voltage gain |
| +A _{VOL} | Positive voltage gain under load |
| -A _{VOL} | Negative voltage gain under load |
| DVDT | Change in voltage vs. time |
| F _{MAX} | Maximum frequency |
| +FSACC | Positive full-scale accuracy |
| -FSACC | Negative full-scale accuracy |
| I _{AMP-IN} | Amplifier input current |
| I _B | Input bias current |
| I _{CC} | Power supply current |
| I _{CC-BLK} | Power supply current, blank mode |
| I _{CC-CONV} | Power supply current, convert mode |
| I _{CC(H/L)} | Power supply current, high/low level |
| I _{CHG(+,-)} | Charging current, + and - |
| I _{D(OFF)} | Drain current, off |
| I _{DD} | Drain supply current |
| +I _{DFT} | Positive drift current |
| -I _{DFT} | Negative drift current |
| I _{DIS(ON)} | Drain and source current, on |
| I _{DN} | Output drive current, negative |
| I _{DP} | Output drive current, positive |
| I _{DSS} | Drain source current |
| I _{EE} | Emitter power supply current |
| I _{EE-BLK} | Emitter power supply current, blank mode |
| I _{EE-CONV} | Emitter power supply current, convert mode |
| I _{FS} | Full-scale current |
| I _{I(H/L)} | Input current, high/low level |
| I _{IH STR} | Start-convert current |
| I _{LEAKAGE} | Leakage current |

INTEGRATED CIRCUIT ELECTRICAL PARAMETER
SYMBOLS AND ABBREVIATIONS (Continued)

| | |
|------------------|--|
| I_{EL} | Input current, low level |
| I_{LOGIC} | Logic power supply current |
| $I_{O(H/L)}$ | Output current, high/low level |
| I_{OS} | Offset current |
| $I_{OZ(H/L)}$ | Tri-state output leakage current, high/low level |
| I_{REF} | Reference current |
| $I_{S(OFF)}$ | Source current, off |
| I_{SC} | Output source current |
| I_{SK} | Output sink current |
| I_{SS} | Source supply current |
| I_{SYM} | Current symmetry |
| I_{ZERO} | Zero-scale current |
| LSB | Least significant bit |
| NONLIN | Nonlinearity |
| OFFERR | Offset error |
| OFFSET | Offset voltage |
| PWD_{TH} | Pulse width threshold |
| Q TRANS | Storage transfer |
| ΔR_{AVG} | Change in average resistance |
| $R_{DS(ON)}$ | Resistance, on |
| +SR | Slew rate positive |
| -SR | Slew rate negative |
| t_{AA} | Address access time |
| t_{AC} | Access time from chip select |
| t_{ACQ} | Acquisition time |
| t_{BLANK} | Blank time |
| t_{CLEH} | Time convert, low to high |
| t_{CONV} | Conversion time |
| t_{DELAY} | Timing delay |
| t_{DP} | Timing parameter DP |
| t_{DS} | Timing specification |

INTEGRATED CIRCUIT ELECTRICAL PARAMETER
SYMBOLS AND ABBREVIATIONS (Continued)

| | |
|-------------------|--|
| t_{DSC} | Timing parameter DSC |
| t_{HS} | Timing parameter HS |
| $t_{OFF/ON\ HBE}$ | High bit enable propagation delay |
| $t_{OFF/ON\ LBE}$ | Low bit enable propagation delay |
| t_{PD} | Propagation delay time |
| t_{PD-DO} | Propagation delay time from clock input to data output |
| t_{PDE} | Propagation delay from register enable to output |
| t_{SETUP} | Setup time |
| V_{CC} | Collector supply voltage |
| V_{DD} | Drain supply voltage |
| V_{EE} | Emitter supply voltage |
| $V_{I(H/L)}$ | Input voltage, high/low level |
| V_{LOGIC} | Logic voltage |
| $V_{O(H/L)}$ | Output voltage, high/low level |
| V_{OS} | Offset voltage |
| V_P | Pinch-off voltage |
| $V_{R(FREQ)}$ | Voltage, reference frequency |
| V_{REF} | Reference voltage |
| V_{REFL} | Reference voltage under load |
| V_{SAT} | Saturation voltage |
| V_{SS} | Source supply voltage |
| $V_{TH(H/L)}$ | Threshold voltage, high/low level |
| V_{TN} | Threshold voltage, negative |
| V_{TP} | Threshold voltage, positive |